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By Jeffry Beeler
CW Staff

BOSTON — Despite a penchant for leaden technical jargon, people in the U.S. computer industry are no more guilty of misusing English than any other segment of the population, according to noted NBC-TV news commentator and author Edwin Newman.

On the other hand, computer people have probably contributed as much as most groups to the lamentable decline in the American public's ability to speak and write effectively, said Newman, the featured speaker at last week's joint symposium of Wang Laboratories, Inc. computer and word processing systems users.

Newman, whose public appearances and books — especially the best selling *Strictly Speaking* — have made him one of the nation's leading champions of correct usage and plain talk, was relatively generous in his appraisal of DPers' communications skills. When asked after his address how computer people compare to the rest of the population in language proficiency, the NBC newsman replied, "I understand the computer industry's need for a special language to communicate its ideas, and when I attended a Wang product demonstration earlier in the day I was surprised at the conciseness of the presentation."

Although he stops far short of praising "com-

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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CW Photo by M. Zientara

In U.S. at Last

Russian computer programmer Boris Katz has arrived in the U.S. after a three-year struggle to leave the Soviet Union, and he and his 13-month-old daughter Jessica shared an issue of Computerworld last week. See story on Page 4.

Carter Readyng Privacy Initiative

By E. Drake Lundell Jr.

CW Staff

WASHINGTON, D.C. — The Carter Administration will launch a major "initiative" in the privacy arena early next year, according to informed sources here.

The initiative, which may receive mention in the President's upcoming State of the Union message, will deal primarily with the privacy of medical, credit and insurance records, the sources said. It may also deal with the amount and type of data that police agencies can collect from private sources without a warrant or subpoena.

The final outlines of the issues Carter has to resolve for the initiative are being hammered out here by a group led by Richard Neustadt, assistant director of the White House Domestic Policy Staff. Input has come from the National Telecommunications and Information Administration (NTIA), the Department of Justice, the Department of the Treasury and the Office of Management and Budget, among others.

The "options" list is being drawn from all the recommendations of the Privacy Protection Study Commission, submitted in July of last year, Neustadt said last week. The President has not yet decided on the priority items, he added.

The commission was mandated to recommend privacy action in the pri-

vate sector. Neustadt said it is unlikely that action will be taken in all areas of the Privacy Commission report "simultaneously" and that the legislative initiatives next year will be limited.

Next year's initiatives will most likely deal with credit, insurance and medical recordkeeping practices, other sources

(Continued on Page 8)

London 'Times' Shuts Down

By Rex Malik
Special to CW

LONDON — The venerable *Times* was shut down here last week in a dispute that involves the introduction of computer-based typesetting equipment, and no one knows when — or if — the 197-year-old institution will publish again.

Times newspapers also closed *The Sunday Times*, *The Times Higher Education Supplement* and *The Times Literary Supplement*, jolting the reading habits of the British establishment, which has regarded

The Times as its quintessential mouthpiece through the years.

The major stumbling block in *The Times* negotiations with its unions involved the use by journalists of computer-based systems to enter stories directly into the paper's computerized typesetting systems. The local in-house union — or chapel — of the National Graphical Association (NGA) contended that such a move would eliminate many of its members' jobs.

The NGA said while it welcomes

(Continued on Page 6)

Most industry analysts last week said the price cuts were "expected" and "no surprise." The moves show a growing competitiveness on the part of IBM and indicate the firm is about to bring out a new range of computers, they maintained.

IBM's previous price of \$110,000 per 1M byte of memory "stood out like a sore thumb" among its competitors, which offer 1M byte of memory for

(Continued on Page 8)



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Says Industry Not Helping U.S. Defends Work on Data Policy

By E. Drake Lundell Jr.

CW Staff

NEW YORK — Exemplifying the adage that turnabout is fair play, government officials indicated here last week that they have been hard at work drafting U.S. policies for transborder data flow regulations and that industry's response and input have been lacking.

Reacting to criticism from computer users within large multinational corporations that a U.S. policy is lacking in this area [CW, Dec. 4], several Administration officials said the criticism was "unfair."

At a session on "Data Regulation: European and Third World Realities" sponsored by On-Line Conferences Ltd., William Fishman from the National Telecommunications and Information Administration (NTIA) told a

group of concerned industry members that "we have been trying to get more industry involvement" in formulating U.S. policy.

The NTIA is drafting guidelines for U.S. delegates on negotiating transborder data flow issues, which are expected to be ready by July 1979, Fishman noted.

The government has been looking for examples where European countries' privacy and transborder data flow regulations have had an economic impact on business.

If that impact is not too severe, it may not call for U.S. action, and meeting the regulations may just be the cost of doing business in those countries, he said, adding that so far "I don't think the response from industry has been good."

Fishman added that the NTIA "has

made a fairly vigorous effort to get reaction "by attending meetings of computer users concerned with the issue and through articles in the trade press."

In addition, Richard Neustadt, assistant director of the White House Domestic Policy Staff, assured the group he would be glad to arrange a meeting for them in Washington with policymakers in this area, and he urged them to provide more input to the process of formulating policy.

"We need your help," Neustadt said, "and look forward to hearing from you."

He also noted, however, that the group's concerns about the lack of a central authority within the government for studying these issues was "well taken," but added that the ability of such a central authority to act on complaints about privacy abuses "will be limited" without regulatory authority over the operation of data banks.

Furthermore, Neustadt told the group it should contact Fishman or Morris Crawford in the State Department's Office of Bilateral and Multilateral Science and Technology Programs about their concerns.

Crawford, who was also on the panel, indicated there is general agreement on what amount of data protection should be afforded to individuals both here and in Europe.

The difference between the two areas, however, is in the machinery needed to provide data protection, he said.

Electronic Mail Meet Today

WASHINGTON, D.C. — Vendors, large-scale mainframe users and executives interested in electronic mail and communications technology will participate here today and tomorrow in a series of task groups organized by the American National Standards Institute (Ansi) in cooperation with the Computer and Business Equipment Manufacturers Association (Cbeam).

The three task groups — X4, X4812 and X4812/WG-4 — will deal with office machines, word processing and the formation of specific working

groups, respectively. They will attempt to define as completely as possible standard requirements to enable different vendors' equipment to eventually communicate with each other, said group coordinator Roger Myers.

The meetings will discuss communication standards for protocols, end-line tailoring, line speeds, transmission modes, communications control codes and signal types.

Interested individuals and societies can call Myers directly at (202) 447-4437.

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A message from John R. Bennett
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Two Programmers Make It to the U.S. at Last

By Marguerite Zientara

CW Staff

CAMBRIDGE, Mass. — Two Russian computer programmers arrived here with their family 11 days ago after a three-year struggle with the Soviet government to emigrate to the U.S.

Boris and Natalia Katz's desire to leave the Soviet Union became an urgent need when their first child, Jessica, was born in September 1977 with a rare ailment that Soviet doctors claimed they could not treat. Through the intervention of several American groups dedicated to helping Soviet Jews leave the Soviet Union, as well as help from Sen. Edward M. Kennedy (D-Mass.), the Katzes finally got permission to leave Russia six weeks ago and arrived here Nov. 30.

When asked the reason for his original application in 1975 to leave the Soviet Union, Boris Katz explained, "My understanding of truth and lies is very different from the understanding of these things by the Soviet government.

"Secondly," he said, "I wanted to be with my family." Since 1975 Katz's mother and two brothers have lived here in Cambridge, where one brother is studying mathematics at Harvard University and the other is a professor of mathematics at MIT.

The soft-spoken scientist and his wife, Natalia, both 31 and both computer programmers, were refused permission to come to the U.S. by Soviet officials on national security grounds. The Soviet officials claimed that Natalia, who worked as a programmer for the government's Institute of Meteorology from 1970 to 1974, had access to confidential information, although Boris Katz denied that was true.

"She worked only in mathematics, but some sections of the Institute of Meteorology dealt with secret work and some people there maybe knew state secrets," he explained. "That is why she was supposed to know confidential information."

When the Katzes decided in 1974 to apply for visas to come to the U.S., Natalia changed jobs and went to work for the Institute of Geophysics in Moscow.

In Russia, when one wants to emigrate, one must give one's employer papers indicating the desire to emigrate. The employer then submits papers to Ovir, the visa office. When Natalia told her employer in 1975 that she wanted to emigrate, she was fired from her job at the Institute of Geophysics. "We applied for jobs [for her] after that, but after applying for emigration from Russia, it's very difficult to find work," Katz said.

Katz himself worked for eight years as a programmer for the Scientific Institute to Research Tractors after having graduated from the University of Moscow in 1970. His work for the institute, which is dedicated to the improvement of tractors, involved statistical and economical problems related to such improvement.

The Katzes persisted in their efforts to leave the Soviet Union after applying in 1975. In September 1977 their daughter Jessica was born suffering from malabsorption syndrome. The rare ailment meant that Jessica could not digest food, had diarrhea and gained no weight from the age of two months until she was six months old,



CW Photo by M. Zientara

Boris and Natalia Katz with 13-month-old Jessica relax at the home of Katz's mother after their long-awaited journey to the U.S.

although she grew in length about 10 centimeters.

"She was very thin, like a finger, and she was almost dying," Katz recalled. Soviet physicians said they could not treat Jessica, but, through the intervention of Action for Soviet Jewry, a U.S. group working for the release of Jewish families from the Soviet Union, Jessica survived on an American-made formula.

The formula, Pregestimil, was prescribed by Dr. Richard Feinblom of Cambridge, who diagnosed Jessica's illness over transatlantic telephone. It was carried to Russia in cans by American tourists. With it began the slow but steady improvement of Jessica's health and only now, at 13 months, is she being weaned from it.

"The first delivery of the formula came when Jessica was six months old," Katz said. "If it hadn't come then, I think she wouldn't be alive now."

The Katzes finally got permission to leave the Soviet Union six weeks ago, a month before the birth of their second child, Gabriella, on Nov. 20.

Permission was granted largely through the efforts of Kennedy who, during a visit to the Soviet Union last September, submitted a list of 18 fami-

lies who wanted to leave Russia to Soviet President Leonid Brezhnev.

While emigration to the U.S. from Russia usually involves a three- to four-month wait in a Rome emigration camp, the Katz family spent one night in Vienna, went to Zurich the next day and, after a half-hour wait, got on the airplane to Boston. Katz credited Kennedy with making his trip so expeditious.

Katz's DP Activities

While working at the Scientific Institute to Research Tractors, Katz also followed other interests in the computer field. From 1972 to 1975, he was a post-graduate student at the Institute of Geophysics, where he studied earthquake prediction techniques. Although there are a relatively large number of earthquakes in Russia, Katz said, his area of interest was California.

In 1976, Katz took a one-year course of study on operating systems given by Siemens Corp.

During these years, Katz had two articles published in the monthly Russian technical journal, *Automatics and Remote Control*. In 1972, he wrote an article describing a computer system

1. В тумане сумерки остались,
И мой краснеет человек,
Над лесом ели зимовали,
И дикий, мелкий, щедрый снег.
И шептается волна морская,
Томится тусклое тепло,
Влюбилась робкая, немая,
И шелестит еще стеклок.

2. Быстрые — как будто тень спала —
Высокий месяц.
И паутина умерла
Зимой над лесом.

3. Умирающий — в смятении.
Вновь, как тень, огни дрожат,
Вновь над бездной движены —
Где-то далека душа...
Крик смертельный рядом, зыбкий,
Тлели в хрусталье глаза,
Шелест мечется с улыбкой,
Где-то в чаще небеса.

4. И позади цветок сереет,
И ясноглазые белеют,
Отточенный спокойно лед.
Как тень, прозрачно утро славит,
И зыбкий музыкант лукавит:
Прозрачно-бледная придет.

1. Twilight remained in mist,
And my man blushes,
In the woods first wintered,
And wild, fine, lavish snow.
And sea waves whisper,
Languishes dull warmth,
Timid, dumb, she fell in love,
And still rustle glasses.

2. Faster — as though a shadow fell —
High moon,
And cobweb died
In winter over the forest.

3. Dying — in confusion.
Again, as shadows, fires quiver,
Again over an abyss of motion —
Somewhere far is the soul...
A death cry is near, and unsteady,
Smoldered eyes in crystals.
Rustling is marked by smiles,
Somewhere in the heart of the sky.

4. And a flower shows gray behind,
And clear-eyed whitens,
Steadily sharpened ice.
As a shadow, transparently
glorifies the dawn,
And unsteadily the musician
is cunning:
Transparently and pale she
will come.

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These are the first four verses of a 21-verse poem generated by computer using Katz's poetry-writing program. Katz stressed that the English translation is word-for-word and therefore loses much of the Russian version's rhythm.

he developed that could "grasp" secondary school level mathematical problems about movement.

This year, Katz published an article concerning a complex poetry-writing program, along with examples of computer-generated poetry, one of which is reproduced below with its English translation.

When asked if he is a poet, Katz replied with a smile, "No, my computer is a poet." While his poetry is actually generated by the computer using algorithms, "all the examples I've seen of 'computer poetry' were written not by the computer, but by people claiming it was written by the computer."

Katz hopes to follow his interest in either computer analysis of linguistics or in computer-generated poetry in this country and is presently looking for work, hopefully in those fields.

The most popular — and most powerful — computers in the Soviet Union are the EC series, which are equivalent to the IBM 360 series, Katz said. "EC" stands for Russian words meaning "Equal System" for all the Socialist countries.

When asked about the sophistication of Soviet computer applications, Katz commented, "They try, but it cannot be compared with the applications here." He added, however, that the Soviets now make many more computers than ever before.

He named three Soviet computer manufacturers, but said he did not know the total number of companies that exist. "I don't think somebody is allowed to know that," he said.

Personal Privacy in Russia

Although the Russian publication *Soviet Studies* reported in 1977 that projects were then under way to ensure that Soviet citizens would have access to personal information held by the government, as well as the means to correct inaccurate information, Katz feels "that will never happen in the Soviet Union." He said technical difficulties will hold back such a project for at least 50 years and, furthermore, "the KGB [Soviet secret police] would never allow it.

"No one knows what the Soviet government knows about me," Katz said, "although I know that in America you can ask some questions about what is written about yourself."

"I am sure that in many, many years it will not happen in the Soviet Union," he added.

By emigrating to the U.S., the Katzes, including 21-day-old Gabriella, have lost their Soviet citizenship. Unless something changes in Russia, Katz said, he is not free to ever visit his country, although he would be "very happy to see [my] friends and homeland."

Many of Katz's friends, a large number of whom are computer scientists, also hope to emigrate to the U.S. within the next few years. Katz noted that many computer scientists want to emigrate from Russia and that a large number of "refuseniks" are computer people. "Refusenik" refers to a Russian who has been denied an exit visa.

Since refuseniks feel freer than other citizens to demonstrate against violations of human rights, and since many DPers are refuseniks, Katz said, Soviet DPers are often more politically active than other people in the Soviet Union.

'A Sorry State of Affairs'

NSF Head Slams U.S. for Poor R&D Support

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Federal support of research and development in this country is "a sorry state of affairs," the director of the National Science Foundation (NSF) contended at the Association for Computing Machinery's (ACM) annual meeting here last week.

Delivering the keynote address at ACM '78, Daniel C. Atkinson said the U.S. has "slipped dramatically" in the last decade in its support of basic R&D. That slip has occurred at the same time other industrialized countries substantially increased their R&D funding, he pointed out.

In a speech entitled "Federally Supported Research: Boon or Boondoggle?", Atkinson cited NSF figures indicating that in the 10 years from 1966 to 1976, the percentage of the U.S. gross national product (GNP) spent on R&D declined from 3.1% to 2.2%.

During that same period, R&D funding as a percentage of GNP increased in the Soviet Union from 2.4% to 3.2%, in West Germany from 1.6% to 2.1% and in Japan from 1.4% to 2.1%.

While American industry continued to show a "strong commitment to R&D" in that 10-year period, the emphasis has shifted from long-term research to research programs that will produce a payoff in the short-term, Atkinson said.

President Concerned

That industry trend and the fact that federal funding of R&D dropped from 13% of the federal budget in 1966 to 6% in 1976 have aroused White House worry, according to Atkinson, who characterized President Carter as "very concerned" about R&D and technological innovation in the U.S.

Carter's commitment to increasing R&D in the U.S. is "much more dramatic than some might realize," he said. The President has called for a review of technological innovation in the U.S. which, when completed in the spring, will provide "policy options" for Congress.

In addition, Carter has specifically exempted R&D expenditures from his call for budgetary cutbacks to fight inflation. "There has to be some tax incentives in the system to make sure that industry makes more of a commitment to longer term research," Atkinson said.

Carter has taken the time to "scrutinize" NSF's R&D budget "line by line" to familiarize himself with what the organization is doing in this area, he reported.

NSF has put up \$13.9 million this year to support computer science R&D, a figure which Atkinson said represents 40% of all federal funds spent for that purpose. It is a "sorry state of affairs" when his country "commits such a small amount of money to such an important area," he declared.

Myth Destruction Urged

Beyond increasing federal funding of R&D and supporting a strengthened R&D effort in the private sector, Atkinson said it is necessary to assure the health of university R&D programs, especially in computer science,

and to attract the best students to the sciences. "The myth" that the sciences are overpopulated and offer little future for bright students must be destroyed.

"We have to build better bridges between our university research groups and our industry groups," he said. The cooperation that formerly existed between the two sectors must be restored, and the federal government should foster that initiative, he believes.

One area in which this country "is lagging and lagging very badly," he said, is in the production of scientists from universities who are familiar with the latest developments in industry.

Businesses are not as concerned with basic university research as they are with the caliber of students coming from that environment, he noted.

cial intelligence and mechanical engineering.

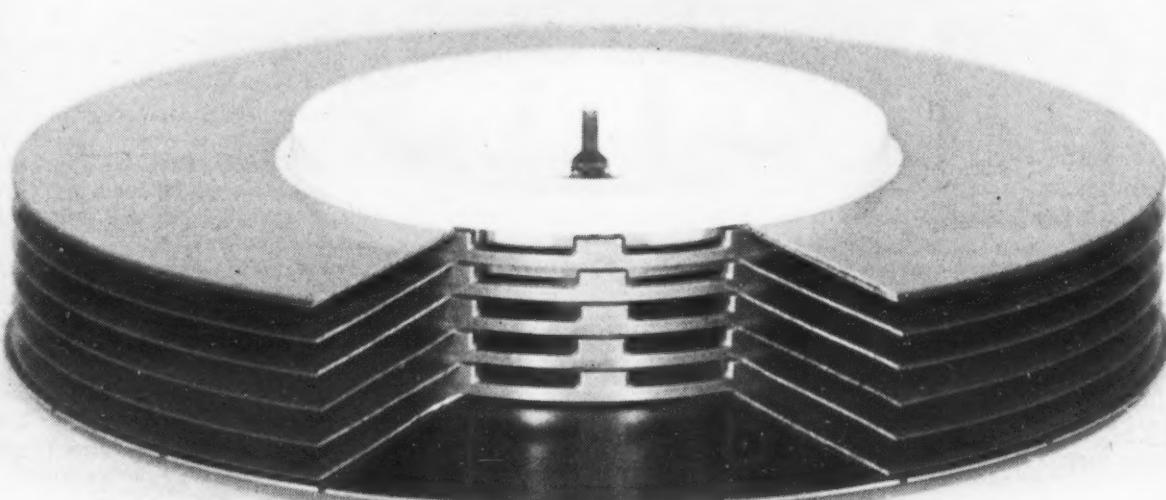
NSF will soon complete a study on computer science and engineering research that will form the basis for federal support of more university R&D programs. In addition, he said, there has to be a greater flow of computer scientists "through the academic pipeline."

In 1977, according to NSF statistics, only 300 Ph.Ds graduated from U.S. universities and only 2,800 persons obtained master's degrees in computer science. This level "in no way meets the needs of the country," Atkinson maintained.

CW At ACM

Addressing that point, Atkinson said it is necessary that universities have the latest in equipment. In the computer science field, that means not only state-of-the-art computers, but also instrumentation and other auxiliary equipment for programs such as artificial

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6

Newman: Misuse of English Not Totally Fault of DPers

(Continued from Page 1)

puterese," Newman finds DP jargon less objectionable when it comes from industry professionals than when it's practiced by outsiders. "I'm disturbed by the avidity with which some laymen adopt computer language when it's not necessary," he complained. "So, in one sense, [the technical terms used by computer people] should be resisted."

Newman offered his observations about language use and misuse in the computer industry shortly after delivering a brief address entitled "Preserving a Civil Tongue." Before a nationwide gathering of Wang Systems users, the newsman confessed some discomfort with the term "word processing" because, he explained, "I've always believed words should be spoken and written, not processed."

Otherwise, he said, he sees nothing "farfetched" in speaking to a group of computer users about the frightful state of American English. "There are no inappropriate forums" from which to attack the "dull, mushy, boneless, gassy" language that pollutes much of contemporary speech and writing, he insisted.

Important to Everyone

Contrary to popular belief, clear and concise communication is important to everyone, regardless of one's occupation. Despite the rapid growth of television and other electronic media, language remains the principal means of formulating and exchanging ideas, and failure to communicate effectively usually signifies an inability to think clearly, Newman said.

Moreover, he added, hazy communication wastes time and labor, creates confusion and results in surplus paperwork, the bane of business.

Unfortunately, many Americans seem irresistibly drawn to pompous, unnecessarily convoluted language either because they think it makes ordinary thought sound more impressive or because it obscures otherwise glaring gaps in their reasoning.

Sample Misusages

In last week's address, as in *Strictly Speaking* — probably his best known plea for linguistic common sense — Newman supported his observations with sample misusages drawn from nearly every major walk of professional life including government, education, business and the news media.

Newman reserved some of his sternest criticisms for the nation's educators, whom he said almost never use simple, straightforward language when they can find a more recondite substitute. In the gobbledegook of contemporary education, students no longer attend school; they become "involved in the educational process," he said.

Once enrolled in classes, students prepare for "performance evaluations" (tests) by consulting "bibliographies of books" where they no doubt find a few texts of "easy difficulty" and perhaps even some suggestions for "recreatory reading."

In business, executives stress the importance of the "deciding act," exhort more "labor force participation (work) from their employees and extol

the virtues of a "high personal autonomy quotient" (self-reliance). No business seems immune from the impulse to inflate or distort language, not even the companies that sell "ice cream transfer spades" (ice cream scoops), "Sealy sleep systems" (beds) or furniture made of "man-made vinyl."

Business, like government, has turned "izing" — the coining of formidable nonsense words ending in "ize" into a new national pastime, Newman reported. Executives now "cognize" business strategies, "officialize" corporate policy and pay "permanetized" taxes.

Of course, only potato chip makers can "crispenerize" their products.

Williams Found Guilty

LOS ANGELES — Barbara Jean Williams has been found guilty in Los Angeles Superior Court on charges of welfare fraud and perjury for what was termed the biggest welfare fraud uncovered in the U.S. to date.

Williams bilked Los Angeles County out of \$240,000 by using eight fictitious names and collecting welfare payments for more than 70 children — only four of whom were actually hers. She managed to cheat the system for seven years by fabricating drivers' licenses and birth certificates that looked legitimate to welfare case workers.

Williams succeeded with the scheme until a routine computer match hit on a duplicate address

[CW, June 18].

In order to avoid a recurrence of the rip-off, the department has tightened up verification procedures. The birth document of one child in every welfare case will be verified by a staff member to determine the document's legitimacy.

The 33-year-old Williams drove to her trial each day in a silver Cadillac. Superior Court Judge Kenneth Gale heard her case without the presence of a jury, a procedure which Williams had requested.

Williams was found guilty of 10 counts of welfare fraud and 12 counts of perjury. She faces up to eight years in prison. Currently free on \$50,000 bail, she is scheduled to be sentenced on Dec. 28.

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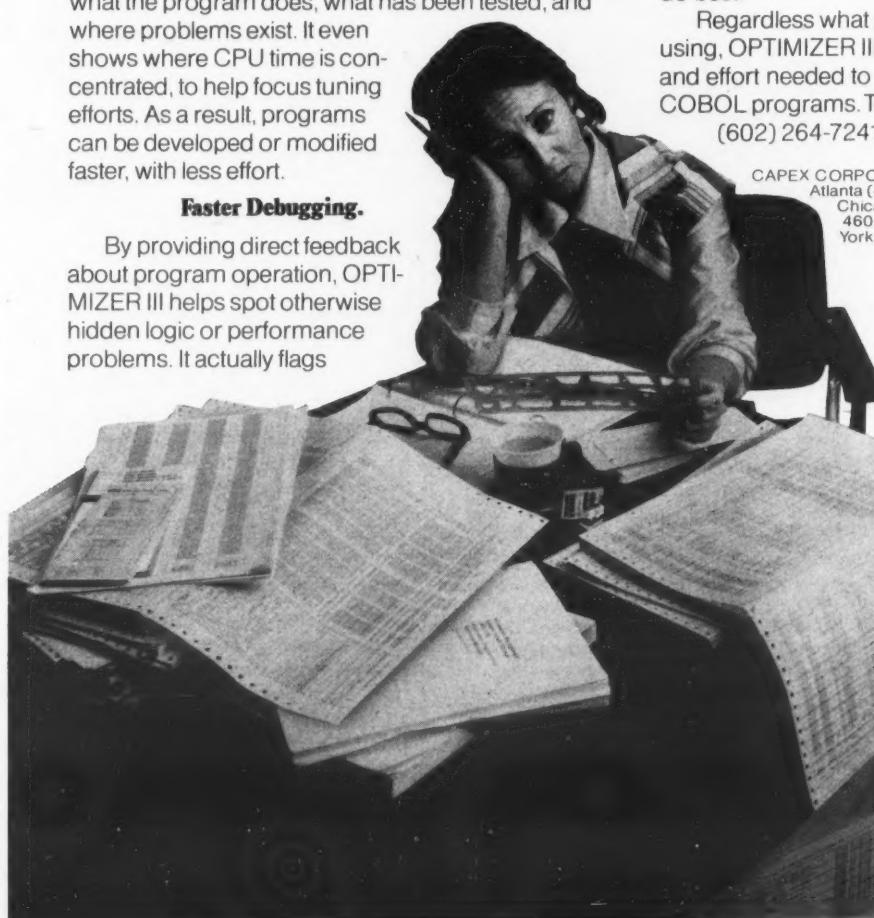
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IBM Price Cuts Seen Presaging System Debuts

(Continued from Page 1)
prices ranging from \$70,000 to \$85,000, according to Harry Edelson of Drexel Burnham Lambert, Inc.

The 10% difference in the reduction of purchase over lease prices indicate IBM is trying to motivate users to purchase its systems, several analysts said, pointing out this often presages system introductions.

Most IBM watchers now feel IBM is going to announce at least three members of its E series of computers in January, with the three processors going under the name of AIM (for Aztec, Inca and Maya) internally.

With the purchase price reductions in memory, the firm may be able to spark some users in the under-138 class to purchase systems, the analysts said, and therefore won't have to replace rental machines with the new series.

Furthermore, the incentive to purchase may also keep the purchase level high on the 30 series of processors, clearing the way for the H series of larger systems expected at the end of 1979 or early 1980.

While many analysts see the price cuts as "competitive" against IBM's plug-compatible competitors, those competitors were apparently not caught by surprise.

Amdahl Corp., which markets memory for \$85,000 per 1M byte, said it probably will not reduce its memory price because the reduction would "not

be that significant in terms of the cost of the whole system."

On the other hand, Itel Corp., which has followed IBM's price of \$110,000 per 1M byte rather consistently, reacted immediately by dropping its prices to \$75,000 per 1M byte.

"The price reduction by IBM was not as aggressive as we had expected," a spokeswoman said, adding that "we have announced and are now shipping a 16K-bit chip for memory, so IBM is now catching up to us [in technology]."

Reactions to the move by other memory vendors and leasing companies were varied.

Kent Mueller, product marketing manager with the Commercial Systems Division of Intel Corp., said the announcement was not a total surprise to that company.

"We had anticipated a price reduction, but thought it would come during the first quarter of 1979. Some of our price reductions anticipated IBM's action, and we are evaluating the scope of the announcements."

"The differential in the price cuts — 20% on lease/rental, as opposed to 30% on purchase — obviously means IBM is encouraging users to buy, rather than lease," he added. "This may be in anticipation of IBM's Series H."

A spokesman for Ampex Corp. in El Segundo, Calif., said that company will hold the line on its prices "at this

time." He noted, however, that Ampex's prices are below IBM's.

Richard Egan, executive vice-president of Cambridge Memories, Inc. of Waltham, Mass., echoed the Ampex spokesman, stating that the company is looking at the possibility of price reductions, but has not yet made any decisions.

"It will really be a matter of what the competition does," he said. "If history repeats itself, there probably will be a price reduction." He predicted the net effect of IBM price cuts on the industry will probably be to "quicken the pace of business, because [users] will no longer be sitting and waiting for IBM to do something."

From the time of the 3033's introduction until last week, IBM limited its users to a maximum of 8M bytes of

IBM-supplied memory. Several IBM watchers have commented that the reason for this was IBM's surprise at the volume of orders for the system, which strained the company's production facilities.

With the doubling of the chips' density, IBM has effectively doubled its production capacity, according to Paul Raynault, vice-president of Computer Finders, Inc. of Hackensack, N.J.

The new price for the 12M-byte version of the 3033 will be \$3,703,000, while the 16M-byte version will go for \$4,003,000. Four-year lease agreements will cost users \$87,010/mo for the 12M-byte model or \$98,090/mo for the 16K-byte version, while monthly rentals will be \$95,650 or \$107,810, respectively.

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Privacy Initiative Readied

(Continued from Page 1)
said.

Although a final decision has not been reached, most sources indicated the White House is unlikely to adopt the No. 1 recommendation of the commission. That recommendation calls on the President and Congress to "establish an independent entity" charged with monitoring and evaluating legislation concerning personal privacy.

"The bureaucratic infighting" over this proposed agency has been "fierce," one source close to the proposals indicated. The administration is moving toward deregulation in a number of other areas, he pointed out, and therefore does not look kindly on proposals for new regulatory agencies.

This does not mean, however, that responsibility for such monitoring will not be assigned to some other agency, the sources said. They indicated both the NTIA and the Justice Department's new Office of Information Policy are in the running for the Administration's blessing as the central contact point for overseeing compliance with present and proposed regulations.

'Big Blue' Very Specific

Presently in at least its sixth draft, the 207-page initiative—known internally as "Big Blue"—will suggest legislation in several areas, following the U.S. tradition of specific legislation for specific types of data as opposed to the European omnibus approach to privacy legislation, according to the sources.

Under the proposals, individuals will reportedly be able to retain a greater degree of "ownership" over data being kept about them by medical, credit and insurance organizations. They would be given the right to see such data and correct misleading or erroneous information.

Presently, an individual is notified if credit rating information is used as the basis of an adverse credit recommendation about him. The individual then has the right to request and correct such information. Under the new proposals, when an individual applies for credit, the credit grantor would have to notify the individual of the types of information it expects to collect from third parties.

The proposals, which would be added to the Fair Credit Reporting Act,

would also allow an individual access to credit information about him and permit the individual to correct the records.

Curbs on Insurers

In addition, the Fair Credit Reporting Act would be amended to include insurance companies in certain cases. For example, insurance institutions would be required, upon the request of an individual, to inform the individual if it has any records on him and grant him access to those records, including medical information.

In the area of medical records, the proposals would make medical care providers responsible for keeping records confidential. They would be prohibited from disclosing information without the data subject's permission except to other medical care providers which were consulted in connection with the treatment of the individual or for public health reasons.

An individual would have the right to see information kept about him by different medical care providers either directly or through a medical care professional designated by him.

Another major thrust of the proposals for legislation could concern the access of police agencies to information on individuals in a number of areas. The Administration fought hard for the Rights to Financial Privacy Act of 1978, which severely limits the amount of information police agencies can obtain about an individual from banks and other financial institutions without a warrant or subpoena.

Some sources feel the Administration may try to further limit the type of information police agencies may request from insurance companies and credit grantors, among others, in its initiative.

However, the departments of Treasury and Justice are reportedly having trouble with this part of the initiative and have been seeking changes in the proposal's wording.

The sources noted last week that the final outlines of the privacy initiative will not be fully known until the President has reviewed the working papers, which should be on his desk by now. If the President decides to proceed with the initiative, the legislative program to implement it would be submitted to Congress when it convenes next year — by February at the latest.

Former Ford President on Stand

Character Witness Lauds IBM's Management

By Connie Winkler

CW Staff

NEW YORK — IBM got rave reviews from its first character witness in the U.S. vs. IBM antitrust trial here. The witness was Arjay Miller, dean of the Stanford University Graduate School of Business and former president of Ford Motor Co.

"IBM is an exceptionally well

managed company and the excellence of IBM's management is one of the principal reasons for its success as a corporation," Miller told the court during two days of testimony last week. When pressed during cross-examination, however, Miller said he had no opinion whether IBM or Ford was better managed during his period as president, from 1963 to 1968.

Miller, who is on the boards of six major companies, was one of the "whiz kids", 10 Army Air Force officers including former Secretary of Defense Robert McNamara who went to Ford as a group after World War II and rose quickly through the ranks.

Miller agreed with Justice Depart-

ment counsel that Xerox Corp., General Electric Co. and most of the top 100 firms of the Fortune 500 are also well managed, but he singled out IBM as "exceptional." Miller said he based his opinion on recent talks with six of IBM's top nine executives, his acquaintance with IBM directors and Chairman Frank T. Cary, IBM's profitability and the 124 Stanford MBAs IBM has hired — including Cary.

IBM apparently called Miller to counter testimony by government witnesses that IBM was not well managed and not a good corporate citizen because it engaged in monopolistic practices. The Justice Department attacked Miller's opinions by showing they

were based on personal associations and were formed prior to his deposition in this case, when he had only general information about the company.

Talent Scarcest Resource

Much of Miller's testimony was a general discussion of how his own management theories parallel IBM's. "The single most important difference among companies is people," he said, and the scarcest resource in government and business is management talent — people who have the ability to get things done by effectively using limited resources.

(Continued on Page 10)

Blown Fuse Halts Input of Data At Logan Airport

By Marcy Rosenberg

CW Staff

BOSTON — A sudden power loss kicked out Logan Airport's radar system here recently, cutting off the input of air traffic data to the airport's mainframe for about one hour.

Radar scanners supply the computer — a modified Univac 1230 used to store and retrieve air traffic information — with such data as flight names and numbers, altitudes and speeds for incoming and outgoing planes, according to Ray Zazzetti, deputy chief at Logan's control tower.

Although the Univac system "functioned normally" during the power outage, "there was nothing to feed data to the computer" because the radar was down, Zazzetti explained.

A blown fuse in the radar system caused the loss of power in the tower cab and in the radar room where the air traffic controllers work, according to a spokesman for Massport, the state agency that governs the airport. The radar went down between 4:45 p.m. and 5:45 p.m., the spokesman said, noting peak air traffic hours are from 4 p.m. to 7 p.m.

During that hour, the airport subbed in a "hand-carried, hand-manipulated slotting system" to compile and retrieve the data normally supplied by the computer. The manual retrieval system "gets information on aircraft separation based on standards established in terms of time and altitude," Zazzetti said.

While Logan never lost contact with its aircraft, the loss of radar caused 20-minute to 40-minute flight delays for two hours after the system went out, and "it took us three additional hours to make up for the lost time," the Massport spokesman said.

When the radar power failed, 25 to 35 planes were scheduled to take off, and the same number was set to land. "We held all take-offs, but managed to bring in seven to eight planes. Normally we can bring in triple that number in that time," the spokesman noted.

Asked why it took so long to trace the problem, the spokesman said the fuse "was in a remote part of a rather sophisticated circuitry system."

The radar system, he added, does not have a stand-by generator for every fuse, but rather works on a three-phase generator that kicks in only when all three phases go down. The blown fuse, affecting only one phase, didn't cause enough of an outage to activate the generator, but was sufficient to render the equipment inoperable.



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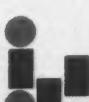
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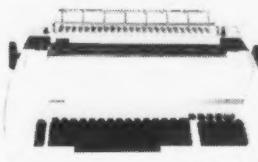
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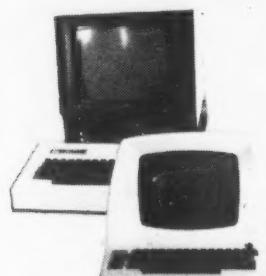
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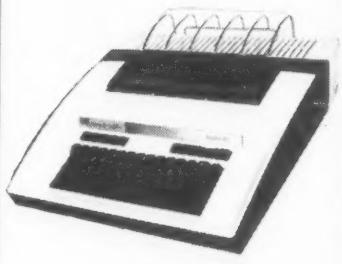


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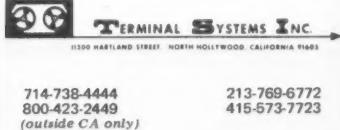


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Cheeky Answer Systems Seen Vital

By Brad Schultz

CW Staff

WASHINGTON, D.C. — Computerized question-answering systems (QAS) should be "impertinent."

In the sense used by Prof. Laurent Siklossy at a technical session of the 1978 Association for Computing Machinery (ACM) convention here last week, a QAS is impertinent if it tells a user something he did not ask.

A sophisticated QAS must be impertinent, providing the user with unsolicited information as well as answering questions. The extra information should be relevant and help the user achieve his goals, the University of Texas computer scientist explained.

Impertinent QAS can minimize the "all too oft-repeated reaction to present-day QAS: 'Why didn't you tell me?' To which the QAS answers, 'Well, you didn't ask.'"

Customer Duped

Siklossy recently collaborated on the design and implementation of an airline tariff QAS developed to field airline customer queries about travel through Europe, North Africa and the Middle East. Drawing from this experience, he illustrated the need for impertinent QAS with a sample dialogue between a hypothetical customer and the system.

The dialogue began with the user declaring his desire to travel by air from Chicago to London and then back to Chicago. The QAS responded by asking when the user wished to depart and when he wished to return home.

The user specified these dates and was then asked, "Will you fly first class?" He replied, "No, economy" and

IBM Managers Lauded at Trial

(Continued from Page 9)

"The ability to attract and use management talent is the principal difference between successful and unsuccessful companies," Miller added. He also stressed the need for companies to be good corporate citizens by, for example, hiring handicapped people, minorities and women.

He talked specifically about Ford's acquisition of Philco in the 1960s. The acquisition was aimed at getting Ford into the lucrative space and defense business and not at getting Philco out of the computer business, thus eliminating an IBM competitor, Miller said.

Miller's testimony complemented that of the previous witness, Thomas M. Liptak, president of IBM's General Technology Division (GTD), which manufactures memory and logic components, including the 64K chip in the recently introduced IBM 8100. GTD is operating at capacity producing those chips, Liptak said.

Liptak spoke generally about IBM's operations, including management's contention systems and checks and balances within the corporation. Liptak's testimony was unusual in this trial, noted for its lengthy testimony, because it took only one day.

Both Liptak's and Miller's testimonies were accelerated because the direct part (questions by IBM counsel) was submitted in a written statement. The narrative technique was encouraged by Judge David N. Edelstein to speed the trial, now in its fourth year.

was next informed of a suitable itinerary, including flight numbers, arrival and departure times and the name of the carrier.

Next the user asked the price of the ticket; the system noted the amount. The dialogue ended with the user acknowledging acceptance of the terms.

CW At ACM

But the user was "had" by this interaction, Siklossy told the session. Because the user never inquired about certain available discounts, he learned of them too late, from fellow travelers. On his return, the user asked the QAS why it had not informed him of these opportunities. "You didn't ask," the system responded.

Siklossy noted that in this example the QAS answered all questions put to it, yet proved inadequate in helping the user attain his objective (to make a journey within certain constraints of time and money). The problem arose from the user's limited knowledge.

Subject Focusing

To avert such a problem, the QAS user interaction must feature a "subject-focusing phase," Siklossy continued. Basically, subject focusing is a procedure by which the user's interests within the "topic space" are made explicit to the system.

Gradually, the user's declared concerns are sharpened through dialogue with the QAS. Wherever possible, values are assigned to the "dimensions" of the topic space.

For example, the dimensions of a trip might include the departure and return times, the coordinates of points visited, the ticket prices, the identity of carriers and the weather and political conditions of the places to be visited.

At some point in the subject-focusing phase, both user and system agree on a "question space," Siklossy said. Beyond this point, true questions can be asked by the user, with answers supplied by the system.

But focusing can lead to "dead ends." For example, the user could state a desire to leave Chicago on the morning of June 1 despite an absence of June 1 morning flights.

Furthermore, certain dimensions may not be assigned values — as when the system does not "think" to ask the user what type of dinner he wishes. In such cases, the system may follow a policy of defaulting to a "normal" value.

For example, if the user does not specify a vegetarian dinner, the system might assume that a dinner featuring meat would be satisfactory.

Situation-Dependent Matter

In general, a QAS should be impertinent if some slight modification of the initial user query results in some very beneficial change of the answer associated with that query, Siklossy observed. Conversely, there is no point in sharpening a query to produce an answer of little or no value, such as a truism.

According to Siklossy, unless the designers of question-answering data base management systems make allowance for what he called the "discontinuity" of the world, QAS will mislead users by failing to mention certain things.

Two Examples

For instance, the user could ask the system how many employees of a given firm earn more than \$30,000 per year and be told "36" without being informed that all 36 employees earned far more than \$30,000.

In another situation, the user might ask which companies supply all parts used by a given department and be told, "companies ABC and DEF." He would not be told that DEF supplied only one part and that all other parts come from ABC.

Data base management research should not be limited to the external organization of data, such as categorical hierarchies, Siklossy told the session.

The useful QAS must do more than understand what has been asked, he concluded; it must understand what has not been asked.

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Out of 'No Man's Land' Panel Agrees Congress Has Entered the DP Age

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — In the course of a few short years the U.S. Congress has emerged from a DP "no man's land" to become a full-fledged member of the information age.

But all that progress has not come easily. Members of a panel at the Association for Computing Machinery's (ACM) annual meeting last week described the process of congressional automation as "a series of ups and downs" and "a steeplechase course."

However, "in spite of all the frustration and occasional disappointments, we have been able to move ahead," according to Robert L. Chartrand of the Library of Congress Congressional Research Service (CRS).

"A dozen years ago there was precious little activity on Capitol Hill regarding computers," Chartrand said. Most members of Congress took a "wait-and-see" attitude about DP at that time, he added.

The breakthrough came in 1970 — during what he called the "dim years" — when CRS contacted more than 100 senators and representatives and more than 150 staff members to determine possible uses of automation.

In 1970 slightly less than \$5 million was spent by Congress on computer-related services. Today the figure is eight times as much. During the intervening years, Chartrand said, Congress has made a commitment to use information technology in order to improve its decision-making process.

Another panel member, John K. Swearingen, director of information systems of the Senate Committee on Rules and Administration Technology Services, noted that while five years ago there were no computer terminals and only "one small computer" in use in the Senate, there are now terminals in every senator's office and the Senate is supported by two IBM 370s.

Example of Progress

CRS, which provides most Congress' DP support, is an example of how far automation has come on Capitol Hill. CRS maintains several large data bases with on-line connections to hundreds of terminals, runs a DP operation that includes two Amdahl Corp. 12M-byte 470/V5s and has a library of more than 5,000 computer tapes and 12G bytes of disk storage.

Congress now employs several hundred DP support staff, the panelists noted, and is moving rapidly into advanced technology. Chartrand cited expanded use of video and cassette technology and experimentation with teleconferencing via satellite as indications of the directions in which Congress is moving.

Boyd L. Alexander, director of information systems in the U.S. House of Representatives, told the panel audience that micrographics will be used in the Legislature's daily operation. The Senate receives about one million letters every month addressed to individual senators, a figure that can easily double or triple in any given month.

That volume of correspondence, Swearingen said, supports the move toward word processing, where "we've really only scratched the surface."

A similar trend is noticeable on the House side, according to Alexander. "The IBM system 6 is particularly

popular on the Hill," he added.

"Basically, we see distributed DP as the way we're moving." Soon, he predicted, congressional committees will have their own minicomputers and mi-

crocomputers, and they will only tie into the House mainframes to access the congressional data bases and for special projects.

Alexander also predicted an increased use of computer graphics, especially

by the committees, and more use of advanced communications. Congressmen have a real need for better contact with their district offices, and direct voice and digital communications links will be established for that purpose, he explained.

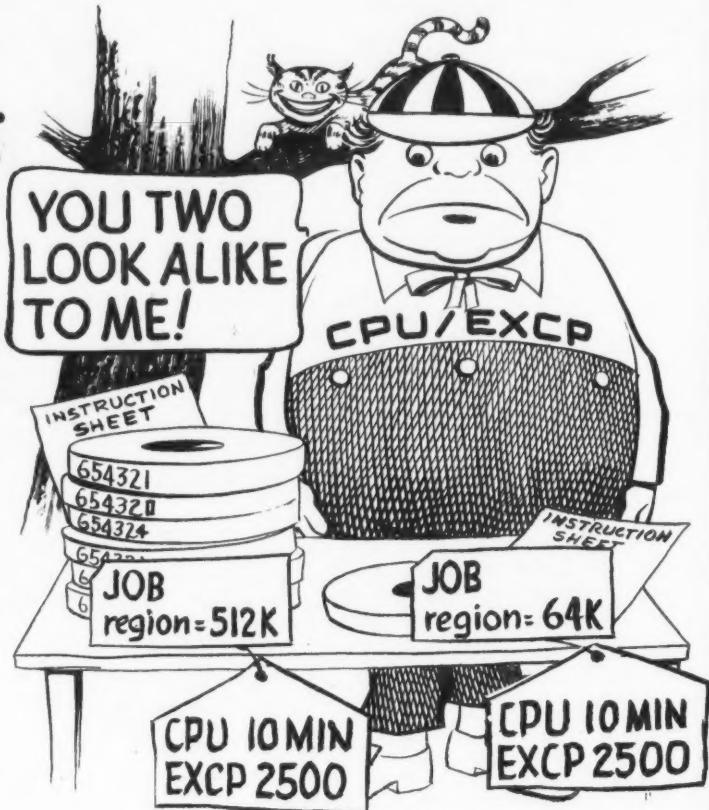
Congress now has the staff, facilities and services to provide timely information that is as accurate and complete as possible, according to CRS' Chartrand.

One sign of that progress, he added, is that Congress, now more familiar with information technology, is showing more concern for the issues that technology raises and is embodying that concern in legislation.

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Carter Administration Favoring Deregulation

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — The Carter Administration is committed to a policy of increasing industrial efficiency and innovation through deregulation, and this policy will be applied to the industry being created by the nexus of computer and communications technologies, according to one Administration official.

Rather than regulating that industry, the Administration wants to clarify the principles needed to develop information policy, according to Paul I. Bortz, deputy assistant secretary for the National Telecommunications and Information Administration (NTIA).

Addressing a session of the annual conference of the Association for Computing Machinery (ACM) held here last week, Bortz said that in the years ahead "we can expect development of many policies which affect information applications and industries," but the industries are too diverse to ever lend themselves to one "single, comprehensive information policy."

One example of the principles to be clarified is that of "fair information practices," which he defined as "assuring individual rights with respect to institutional recordkeeping practices and restricting governmental access to records."

Another example is "market structure and regulatory policy." He called continued competition in providing information services "a desirable goal" and one to which NTIA, the primary advisor to the President on information policy, is committed.

Overlapping Industries

"Where there is overlap between regulated industries such as the computer and information services sector," NTIA espouses "fair and consistent policy" that is based on some deregulation of the regulated industries rather than the regulation of currently unregulated sectors.

In accordance with this view, Bortz said, NTIA will seek "full deregulation of the terminal equipment market."

Explaining NTIA thoughts in this area, Bortz maintained, "The patches being added to the regulatory framework" — such as those added to the Communications Act of 1934 by the first Federal Communications Commission Computer Inquiry in 1971 — do not last very long "in the face of rapid innovation."

Other developments in the "overlap industry" of computers and communications that pose "basic regulatory problems" are, according to Bortz, the Satellite Business Systems (SBS) venture and Xerox Corp.'s recently announced Xerox Telecommunications Network [CW, Nov. 20].

Both activities, he said, "mark the further entry of information-based activities into communications services." That entry is "natural given the technology," but it does raise "fundamental questions as to the future regulation of common carrier telecommunications," he noted.

"This is a big game; billions of dollars are at stake. Even the viability of major corporations at the end of this century will be affected by legislative and regulatory decisions that will be made over the next several years," he emphasized.

Another consideration in policymak-

ing in this area, Bortz said, is fear on the part of the public: "fear of the unknown, fear of job displacement, fear of surveillance, fear of dehumanization."

CW At ACM

Those fears should not be dismissed out of hand. "The emotional element in policymaking must not be underrated"; there are real threats in the advances in information technology, he stated.

NTIA is currently analyzing the "issues pertinent to the current Computer

Inquiry," and the agency's position on one facet of that inquiry is that the terminal equipment industry should be deregulated, Bortz remarked.

Deregulation of that market "will further stimulate the already rapid development of equipment options" that have occurred since the "landmark Carterfone decision," he said. NTIA also believes AT&T must be able to participate in that market and that AT&T's participation should be allowed in a way "to ensure competition that is fair to all parties."

NTIA has yet to propose specific recommendations for such deregulation, Bortz said, but believes a deregulated terminal market "can flourish" consistent with "both the spirit and the letter of the 1956 Consent Decree." NTIA is

also studying AT&T's proposed Advanced Communications Service and the Postal Service's entry into electronic mail.

Some of the other "key issues" being studied, he said, are:

- The appropriate ways to handle information about individuals.
- The steps to be taken to "open access to and encourage maximum dissemination of information."
- How to encourage "the production of information goods and services."
- How to arrange for the "equitable distribution" of communications and information goods and services.
- The market structure of information industries.
- The problem of information and foreign relations.

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ICS Filing Asks \$3.5 Million HP Asks Court to Throw Out User's Lawsuit

By Brad Schultz
CW Staff

NEWPORT NEWS, Va. — Hewlett-Packard Co. has moved for the dismissal of a \$3.5 million damage suit filed against it in U.S. district court here by a former customer, Investment Counseling Services, Inc. (ICS).

The medical billing service bureau has charged HP with fraud and misrepresentation, breach of contract and negligence and malpractice for its role in upgrading the firm's DP facilities. The formal complaint, filed last August, said HP "knew or should have known of certain material deficiencies and inadequacies in the equipment and software" it delivered [CW, Sept. 4].

Debate on the substance of the complaint must now wait until the dismissal motion is deliberated. The dismissal motion argues that ICS did not file the document promptly enough, nor express it in language clear enough, to comply with U.S. and Virginia law and civil procedure rules.

Finding some of the complaint's terms and phrases "redundant, immaterial and/or impertinent," HP asked the federal court to strike this language from the document or direct that it be rephrased in greater detail.

State Action, Too

The vendor also asked the court to delay its proceedings until a parallel

action in Newport News Circuit Court is resolved. That motion seems unlikely to be granted, however, since ICS now intends to prosecute only the federal action, according to the firm's counsel, Thomas K. Christo of Boston.

The federal court suit was filed almost a full year after the state proceedings began, Christo noted. The latter was solely addressed to the breach of contract issue and cannot by itself result in full satisfaction of his client's demands, he said.

The federal suit supersedes the state action, he indicated. Moreover, both parties have acknowledged that simultaneous prosecution would be an expensive duplication of effort.

HP's motion to dismiss the ICS suit argued that the first count of ICS' complaint — fraud and misrepresentation — is nullified by Virginia's statute of limitations on personal litigation. Where applicable, the statute invalidates the suit of an injured party if it was filed more than one year after the alleged injury.

The motion also charged ICS with violating the Federal Rules of Civil Procedure by insufficiently detailing its allegations on all three counts, preventing HP from framing a proper response.

In a brief filed with the U.S. court, Christo countered that the statute of limitations does not apply to the suit against HP and indicated that ICS could not have violated the statute even if it did apply.

According to the brief, ICS did not attempt "full utilization" of the system until January 1977 — although it was delivered in September 1976 — and was unable to properly evaluate the system's performance during the period between January and August 1977. Under constraint of the statute of limitations, if ICS had concluded during this period that misrepresentation had occurred, then the statute would have lapsed by the time the complaint was filed.

The system's hardware and software components were allegedly not "up and working" together during this period, preventing a comparison of benchmarks with contract specifications, the brief explained.

"At least" until the time ICS launched its federal court action, "problems continued to occur, and HP continued to make attempts at repair, including sending at least one unqualified expert to examine and evaluate the computer system and to recommend corrective measures," the ICS brief claimed.

Hence, Christo argued, the statute of limitations could not have lapsed in this matter — if applicable, which he disputes.

Christo called "patently absurd" HP's contention that the complaint was insufficiently detailed. The vendor protested in its motion for dismissal that the second count — breach of contract — was phrased in a fashion "so vague and ambiguous that it does not state a cause of action."

The document failed to define the hardware, software or services alleged to be faulty, HP protested. In an attached "Motion for a More Definite Statement," the vendor asked that these items be specified.

However, the complaint did characterize HP's MPE time-sharing system, data entry library and Image software

(Continued on Page 14)



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ABA Forms Unit on DP-Related Legal Issues

WASHINGTON, D.C. — Ever-increasing dependence on computer systems in the business environment has generated growing concern about the issue of negligence as it relates to the DP community. To address this concern, the American Bar Association (ABA) has formed a Subcommittee on Professionalism and Malpractice of Computer Specialists.

The subcommittee will be chaired by Jay T. Westermeier, an attorney with the law firm of Arent, Fox, Kintner, Plotkin & Kahn here.

Part of ABA's Science and Technology Section Committee on Law Relating to Computers, the subcommittee will examine such issues as the certification and licensing of data processors; standards for determining negli-

gent system analysis, design, implementation and management; improper reliance on computer systems; and malpractice insurance.

Certifying DP professionals may be one way to deal with public concern over computer theft, a concern sparked by "the advent of electronic funds transfer [EFT]," Westermeier said.

"We assume the cost and savings benefits of EFT systems will be so compelling" that these systems will be on the scene for a long time to come "and fraud like [Stanley] Rifkin's \$10 million [CW, Nov. 13] will be inevitable. One possible solution may be to limit access of individuals to computer systems through licensing or certification," he suggested.

Another issue, Westermeier said, is to determine the degree of user reliance on a computer system or vendor that would call for applying professional malpractice standards — such as those imposed on doctors, lawyers and accountants — to system vendors or DP professionals.

Westermeier cited a case in which Triangle Underwriters, Inc. had trouble with a computer system that Honeywell, Inc. developed, installed and had to repair continually. The court ruled that because the system was a turnkey, Honeywell's continuing repair efforts "did not establish the necessary professional relationship to judge the computer company by professional malpractice standards."

Allied with concern over malpractice

standards is the issue of insurance. There have been a number of efforts, Westermeier said, to provide general malpractice coverage to DPers and specific coverage for software vendors.

Dealing With Reliance

About improper reliance on computer systems, he said the subcommittee will look at recent court cases to "educate the DP community" on when management should intervene in an otherwise automated decision-making process "to assure that decisions are not made in an arbitrary computerized mode." One such case, he noted, involved a utility company whose computerized system kept billing a family on two sets of meters.

The subcommittee, comprised of ABA members, plans to make itself available to such organizations as the American Federation of Information Processing Societies, and "we are asking for input from the DP community on some of these issues," Westermeier said.

The ABA, he added, "has an educational function to try to help individuals to better understand the law and their liabilities and rights and to try to alert management to potential legal problems."

HP Asks Court To Dismiss Suit

(Continued from Page 13)

as inefficient and improper for use.

According to the complaint, HP failed to disclose certain flaws in these and other products and misrepresented their performance capabilities. This allegedly caused ICS to purchase goods ill-suited to its needs and forms the basis of the first count.

The second count refers to HP's alleged failure to deliver what was promised and the third count — negligence and malpractice — to the vendor's alleged failure "to provide certain services and advice . . . which equaled or exceeded then-prevailing standards . . . within the data processing industry."

The complaint said that an HP representative verbally assured ICS its products would meet the firm's needs; that the hardware proposed was "fully tested and reliable"; that ICS could easily convert its existing software to the new equipment; and that "HP would furnish to ICS everything that was needed for an efficient, reliable on-line system."

ICS has claimed \$328,000 in damages on the first count, \$2,908,000 on the second and about \$421,600 on the third for a total of just less than \$3,450,000 "plus interest and costs."



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New Security Measures May Help

ABA Finds Banks Cutting Losses With ATMs

By Ann Dooley

CW Staff

WASHINGTON, D.C. — A large number of banks using automated teller machines (ATM) are very pleased with them overall and have reduced their dollar losses since switching from paper-based systems to ATM-based transaction systems, according to a recent survey by the American Bankers Association (ABA).

Of the more than 134 banks that responded to the ABA's poll, 8.9% indicated they had not experienced any financial losses through ATMs, while 78.6% noted that losses with ATM-based systems were smaller than those they had experienced when using more traditional means of accessing demand-deposit and time-deposit accounts.

Approximately 7% of the responding banks experienced nearly equal losses under both systems while the smallest percentage — 5.4% — reported that losses through ATMs were greater than those under the more traditional

transaction methods.

One reason for the reduced losses could be the security methods implemented by the banks with the ATMs, according to the survey. When questioned about their systems' security, 47% reported either no security problems at all or extremely effective security. Forty-three percent indicated only minor problems with ATM security.

Systems Cost-Justified

In addition, 38% believed their systems were cost-justified, while approximately 30% noted their security systems were currently under review. No respondent indicated any major problems with the security aspects of its ATM system.

Most banks responding to the survey claimed that a large percentage of the dollar loss resulted from improper handling of identity cards, either from loss or theft. The survey showed stolen cards accounted for almost two-thirds of dollar losses through ATMs last year.

Approximately 64% of the losses resulted from interception in the mail of the card and/or personal identification number (PIN), loss or theft of the card or other kinds of unauthorized use. Another 22.3% of the dollar losses were attributed to customer fraud, such as use of an ATM after an account was closed or unrecovered overdrafts. Approximately 13% of the losses resulted from internal bank problems such as hardware or software errors or internal fraud, according to the survey.

Liability Limits

Although the loss from the customer's end was high, 62% of the responding banks reported no set liability limit for losses occurring through ATM systems. In most of the banks, the customer absorbed an average of \$25 per loss, but in two-thirds of the instances where loss occurred through ATM transactions, the customer suffered no loss, the survey reported.

The remaining 38% had established customer liability limits. Half set \$50 as their limit, while the other half "reported their customers had a zero loss exposure."

In those banks with set liability limits, the average customer loss was \$13, and in three-quarters of the cases, the bank absorbed the entire loss, the survey results said.

More than half the responding banks indicated that customer liability for loss was determined on a case-by-case basis or determined by customer negligence. Almost one-quarter of the surveyed banks reported the bank absorbed all losses, while nearly 10% indicated either a set dollar limit was used or the customer was responsible for all losses until the card's loss was reported.

Security Devices

To protect customers' funds, the banks employ a variety of security measures. Approximately one-quarter of the respondents indicated a hot-line telephone is provided at the ATM site to report lost or stolen cards, and almost one-fifth of the banks said they use a security camera at the ATM site.

A number of banks use added security measures such as data encryption and separate mailing of the electronic funds transfer (EFT) card and PIN. They also set daily and weekly limits on withdrawal amounts from ATM systems.

One-fourth of the respondents said they allow customers to select their own PINs, but this appeared to be a source of disagreement within the banking community. Some banks contended that customer-selected numbers provide the greatest security, while others believed bank-selected numbers give the best protection.

Those that advocate the bank-selected PIN fear a customer-selected PIN may be easily discovered by a thief from information in the account holder's wallet such as a birthdate or house number.

Many banks gave users more credit for handling cards than they should have, an ABA spokesman said. Banks often found customers writing the PIN on the card itself, loaning the card to a friend or even leaving the card in the machine, he said.

However, those banks that prefer to have customers select their own PINs reported that customer education on preventative measures eliminates most problems. The responding banks pointed out that customers who choose their own numbers are less likely to write them on their EFT cards.

The ABA concluded it was impossible to determine from the survey results whether any kind of relationship exists between additional security measures and dollar losses. The ABA noted that the cause-and-effect relationship could not be determined since the results were unclear as to whether banks had fewer losses because of ATM security or whether they installed the additional measures because of unacceptably high losses.

Rebuttal of 'War Stories'

The ABA mailed the questionnaires in May and June to approximately 225 banks using ATM systems. Sixty percent were returned. The respondents operate about 20% of all ATMs in the U.S., according to the ABA.

The average bank responding to the survey had a system of 14 ATMs with one in 10 off-premise. The average system age was four years, and the mean transaction volume per ATM was 3,760/mo. Two-thirds of the systems had on-line terminals.

Almost half the respondents had deposits exceeding \$1 billion and less than 6% had deposits of less than \$100 million.

The ABA said it undertook the survey to help rebut the large number of "war stories" reported by the media and discussed in Congress about the security problems inherent in electronic banking systems. The ABA believes these claims are unfounded.

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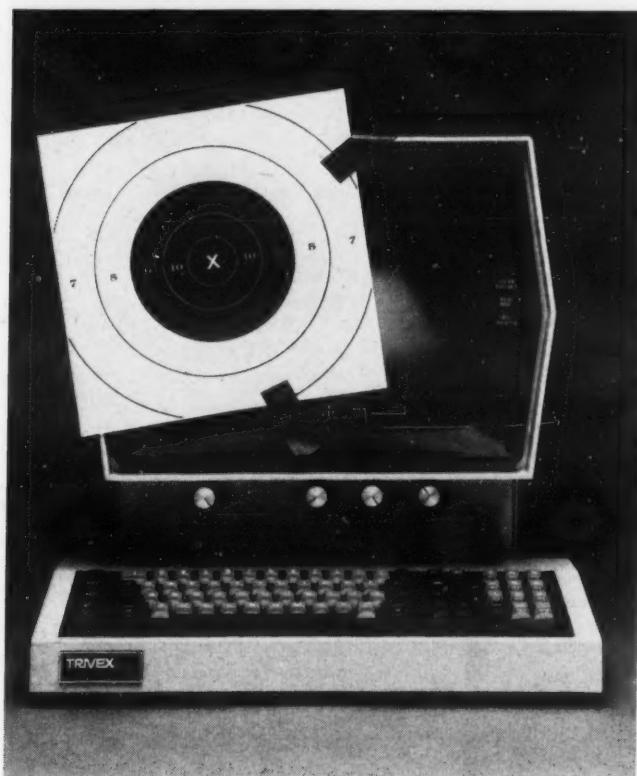
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Notes Net Gain of 13%

Diebold Survey: MIS Spending on the Rise

By Marcy Rosenberg
CW Staff

NEW YORK — Corporate spending for information systems showed a 13% net gain from 1976 to 1977 and is expected to rise an average of 11% yearly during the three-year period from 1977 to 1979.

These were among the findings recently released by the Diebold Group, Inc., a management consulting firm that surveyed some 200 clients for 1977 MIS budget figures and projected spending for fiscal 1978.

Based on 1977 figures, the survey found MIS expenditures exceeded 1.07% of sales in a typical industrial corporation, up from .95% in 1971. That increase, Diebold said,

reflects more spending for hardware as well as for MIS personnel.

capability for fewer dollars," Ferreira added, "but that much more capability is

A reverse trend appears to be taking shape . . . with communications becoming more centralized and traditional MIS areas more decentralized because of distributed processing.

"Hardware budget dollar increases usually mean acquisition of new hardware," according to Joe Ferreira, director of Diebold's research program.

"However, while that is taking place, labor costs are also going up as a result of inflation over normal salary increases and new hires.

"With hardware prices coming down, you can buy more

needed today for the applications made possible by advances in computer technology.

"Companies, therefore, end up spending more for increasingly sophisticated equipment and also for more people to make the systems work. The industry has not yet seen significant improvements in personnel productivity to keep up with increasing hardware performance."

DP Out of DP Area

Employees working within MIS departments comprised 1.58% of the total corporate work force in 1977 compared with 1.41% in 1971, Ferreira said.

However, because distributed processing has made it possible to move some DP functions out of the MIS department budget and into user department budgets, "more and more people will perform DP activities in user areas and will be paid from user budgets," he noted.

In 1977, an additional .22% of all employees in the companies surveyed performed DP-related activities outside the MIS department.

Today, DP employees devote more time to applications work than to redesign and maintenance efforts, according to the survey. Companies are cutting operations personnel budgets an average of 1% per year, from 29% of the total 1971 MIS budget to a current 22%, Diebold found.

New Emphasis

Applications efforts appear to be moving toward distribution — such as inventory shipments — and away from manufacturing — for example, bill of materials processing, the survey found.

Patterns in hardware spending indicated processors and memories remained stable at 43% of the total hardware budget and terminals comprised about 12% while conventional peripherals dropped to 29% and will continue to decline.

In the communications area, Diebold noted a trend to greater convergence of telecommunications and DP systems. About 38% of all firms in the study separated telecommunications from the DP function, but this percentage

decreased sharply as corporate size increased.

DP expenditures in many companies "are fairly well centralized with a single group in overall charge of budgets and spending," according to Ferreira. On the other hand, he noted, "telecommunications is far more apt to be distributed widely throughout the corporation with a variety of authorities in charge of different pieces."

Reverse Trend

A reverse trend appears to be taking shape, however, with communications becoming more centralized and traditional MIS areas more decentralized because of distributed processing, Ferreira added.

Spending for communications averaged .52% of corporate revenues while the average communications budget comprised 52% of the MIS budget.

Communications budgets rose an average of 10.1% from 1977 to 1978, and Diebold predicted they will increase 9.1% annually over the next five years.

DP opportunities are increasing for independent com-

munications carriers and equipment manufacturers over their current 42% share of the data equipment business, according to the survey.

Corporate Plans

The number of companies which have developed an overall corporate communications plan rose by 7% in two years to 47%, and about 60% of the survey respondents indicated plans to obtain more equipment and transmission services from outside the Bell System.

Concerning specific communications trends, Diebold found 51% of the participating companies have combined voice and data networks and 49% are using special devices to monitor communications routing and costs. The most popular of those monitors is from a company other than Bell.

In-house electronic mail "is still embryonic," the survey noted, but while only 21% of the companies have implemented these systems, 40% of those firms not using them plan to experiment with the technology in the future.

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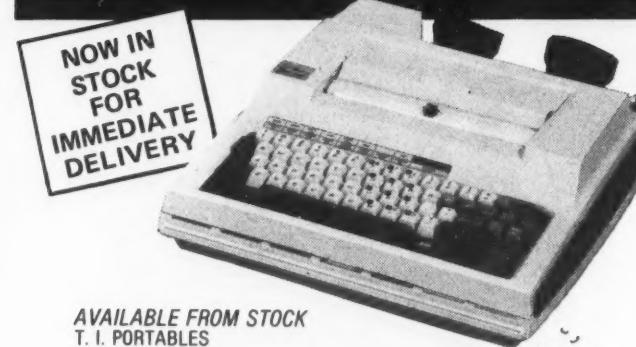
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Conventional fixed network is difficult and expensive to expand and modify as needs grow. And they always do. Communication and utilization of data base records from twice removed nodes is prohibitively expensive in applications programming, so more lines are the only viable solution. And that is expensive, too.

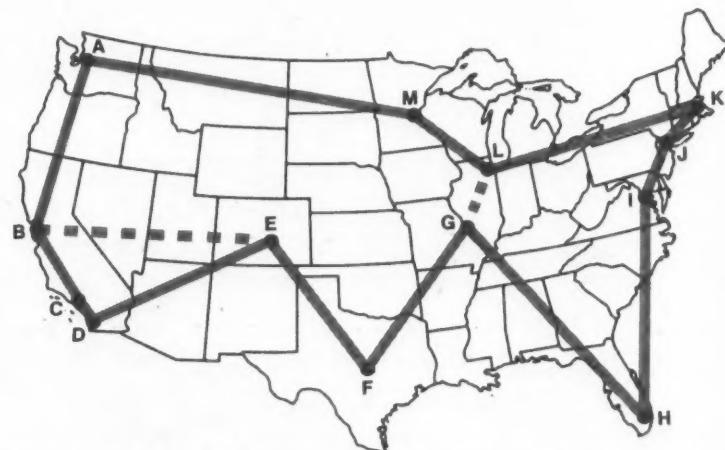
It looks exactly as if all messages were being transmitted only next door. And X25 protocol is available as well.

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To get rid of a host of problems, get rid of the host.

Having a host system in a network is traditional. Unfortunately, it is also the traditional point of concentrated difficulties. For when the host goes down, so does the whole network. And even if the host is only suffering an intermittent difficulty, the integrity of the data base is up for grabs, not only in the host, but throughout the remote data bases as well. With Tandem's GUARDIAN/EXPAND Network, a local failure has no impact whatsoever on the rest of the



Tandem pass-through packet switching enables "A" to communicate with "E" at no penalty in system overhead. And you can add direct lines, per "B" to "E" or "L" to "G" whenever traffic warrants without disrupting system performance or efficiency. Note that nodes can be of variable sizes, all using Tandem NonStop Systems as the common element. Efficient, powerful and extremely low cost.

system, and best-route switching automatically circumvents the trouble spot. If there is a failure in the communication link, the system will automatically go around it. The system and the network stay up and running, and best of all—the data is intact, its integrity assured.

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The long and the short of it— keeping costs down and performance up.

No one can do that like Tandem. For the differing needs at each node can be met by the expandable Tandem NonStop System in varying configurations. Single system programming works over the entire network and will continue to work regardless of growth and complexity of the system. And because this is after all a mini-based system, the costs are low to begin with and add-ons come in low-cost increments. Without one cent of penalty on the original investment.

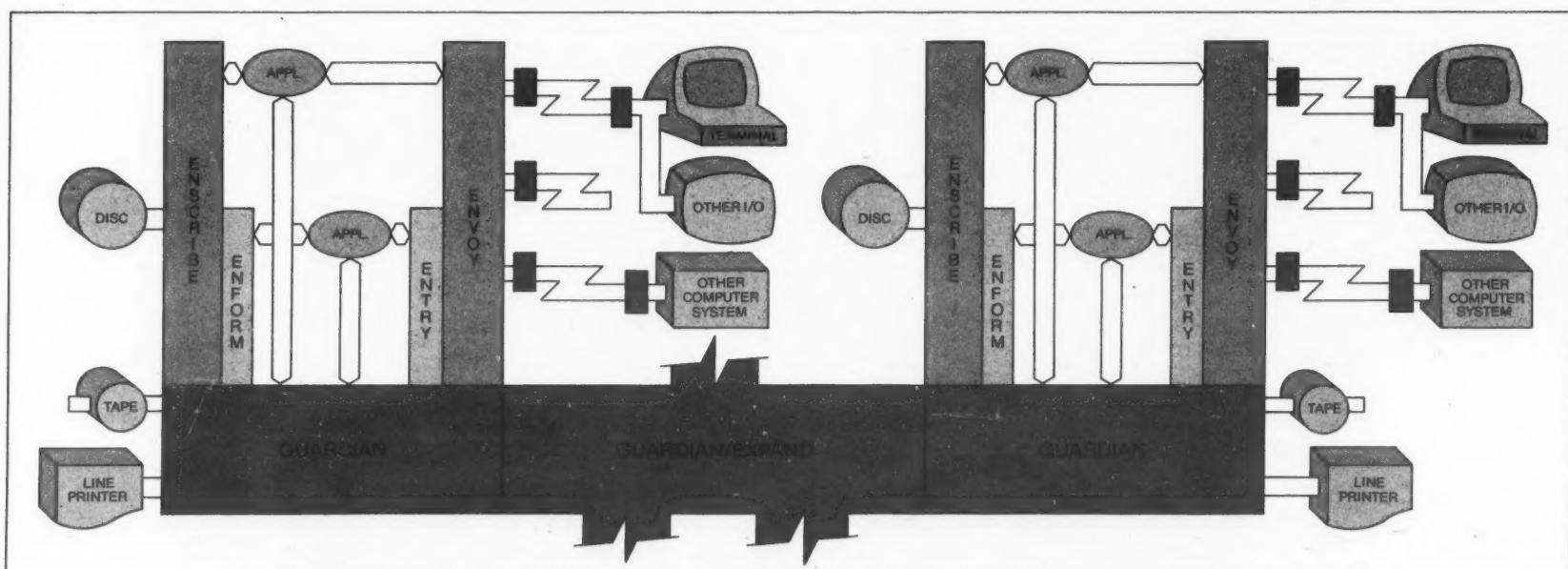
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TANDEM

Under Bank's Volunteer Program

Homebound Handicapped Learning to Program

By Jay Woodruff
CW Staff

PORTRALD, Ore. — The U.S. National Bank of Portland has devoted four years to teaching computer programming to handicapped persons at home.

Homebound Opportunities in Programming Education (Project Hope) is staffed entirely by volunteers from the bank. The project provides the handicapped trainee with a portable terminal and an expert programmer to teach him.

Since programming is "primarily a mental job, handicapped persons adapt to it very well," according to Linda Godson, data base officer at the bank and volunteer head of the program.

Programming instruction is tailor-made for each trainee, and although Cobol is emphasized because of its use in business, other languages are taught depending on the trainee's needs.

Training takes about one year, and students start writing programs as soon as possible because that is the most motivating and fastest way for them to learn, Godson said.

Students begin the course by reading an introductory textbook on computers. A terminal and a book on Cobol are then delivered to the student's home. The book contains practice programs that can be run after the student learns the time-sharing option system the bank uses to enter data.

At-Home Visits

Instructors usually visit the trainee at home twice a week for about three hours each time to answer questions about programs and to show the trainee ways to increase efficiency. "There are usually a lot of questions," volunteer programmer Linda White said. Trainees work at their own pace.

Some trainees also attend school, and they use the computer for school-related projects.

Students enter a program, run it and get immediate reports on the terminal. White said quick feedback keeps students interested in their work.

After three or four programs are successfully completed, the students usu-

Mass. Taxmen Seek DP Advice

BOSTON — The Massachusetts Department of Revenue is seeking assistance from industry experts in preparing sales and use tax statutes for the computer industry.

DP industry representatives and other interested persons are invited to submit descriptions of equipment and definitions of terms used in the normal course of business — for example, hardware, software and descriptions of vendor customer arrangements.

Information should be submitted in writing by Dec. 19. The Revenue Department will meet on that date at 10 a.m. in the 8th floor conference room, 100 Cambridge St., Boston, Mass. 02204.

All persons wishing to attend are requested to notify the Commissioner of Revenue's office.

ally are somewhat self-sufficient, although instructors continue to help them understand new procedures that appear in the text, teach them some that do not and clear up difficulties.

Cost to Bank

The total cost to the bank for Project Hope has been between \$10,000 and \$11,000, but bank officials said it can be done for less if some of the equipment is rented, as U.S. National did before it committed itself fully to the program. Portable terminals can be rented for \$50 to \$75 a month per terminal, Godson said.

The bank paid \$7,000 for hardware and from \$3,000 to \$4,000 to set up the system. The biggest cash investment was for three Texas Instruments, Inc. terminals that cost \$1,500 each.

Two other terminals are on loan from Pacific Northwest Bell, which has maintained a high interest in the project. For mainframes, U.S. National uses an IBM 370/155 and a 370/158 and plans to install a Model 168.

Volunteer Commitment

An important reason for the program's low cost is the commitment of its volunteers. Bank personnel are allowed to contribute two of their weekly work hours to the facet of Project Hope in which they have an interest.

Most persons who get involved in the project contribute more than two hours a week and derive a great deal of enjoyment from it, according to Godson.

"It's exciting to work with the handicapped," she said, "because many of them have not had a chance to get out of their homes and meet other people. When you plug them into the world of computers, they often blossom unexpectedly."

Graduates at Work

Two of the five project graduates work at the bank on a contract basis. When the bank needs a programmer, it contacts one of the two at home, and he estimates how long it will take to complete the job. The programmer is paid a fee, but if the job exceeds the estimated time, he is paid for that time as well.

Ronald Ryan, the first to take the Project Hope course, works for the bank. Hope gave him self-confidence and made a difference in his life. "Now I feel like I am contributing something that someone can use," he said.

Five more students will graduate soon. The number of students trained by the bank is limited by the number of portable terminals available, and Godson said the bank is at a turning point on whether it will expand the program.

One thing is certain, Godson said: "There doesn't seem to be any danger that the program will be stopped; I doubt we could stop it now. With our enthusiastic volunteers, nobody needs to be told what to do, and hardly any administration is necessary to keep the program going."

How successful is the Oregon bank's Project Hope? "Successful, but small," was Godson's assessment. She added that Affirmative Action goals can be met through the program, though the

bank did not have this specifically in mind when it started the program.

More Talk Than Action

Although the program itself may be termed a success, one difficulty remains that the bank has not been able to solve — employment of trainees. The corporations contacted by the bank have expressed an interest in hiring Hope graduates, but few have done so.

"They talk about hiring, but they are very timid about hiring someone who will work at home," Godson said. The reason most often cited is the prohibitive cost of medical insurance for the

homebound handicapped worker.

Although bank graduates are highly qualified, Federal jobs are almost impossible to get because of the red tape an applicant must go through when pursuing the job, according to Godson.

The bank has tried to promote support for the project and has worked to interest other banks by putting together a slide show. The show has resulted in inquiries, but no commitments yet.

"It just takes time," Godson concluded. "We hope we can get more positive responses in the future, and we realize this is just the beginning."

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Latest DP Executive Guide Lists 6,000 Entries

PHOENIX — The Fall 1978 edition of the *Directory of Top Computer Executives* with more than 6,000 executives listed is available from Applied Computer Research.

The directory is arranged geographically by city and state and has a cross-reference index by company name within industry classification. Three government classifications — (federal, state and local) — as well as health services have been added to this edition.

The directory contains 1,500 more entries than the 1977 editions. Guidelines for listing are gross annual sales in excess of \$50 million or annual DP budgets of more than \$250,000, a spokesman said.

Each entry includes the organiza-

tion's name and address, subsidiary and/or division names, phone numbers, major systems installed and the names and titles of the top DP executives — vice-presidents, directors and DP or information systems managers.

In addition to the directory itself, the data base is available on mailing labels, magnetic tape, computer printouts or 3-by 5-inch cards, the spokesman said.

Many Uses

The directory is designed to be used for direct mail marketing, recruiting, arranging meetings or contacting other organizations.

Single copies of the directory cost \$75, with additional copies priced at \$45. An annual subscription, including two semiannual issues, costs \$120,

with additional subscriptions priced at \$72.

Applied Computer Research is at P.O. Box 9280, Phoenix, Ariz. 85068.

Calendar

Jan. 13-April 28, Cleveland, Ohio — **CDP Review Course**, sponsored by the Cleveland and Erieview chapters of the Data Processing Management Association, Cleveland chapter of the Association for Computing Machinery and Cleveland State University's Computer and Information Sciences Department. Contact: CDP Review, P.O. Box 6772, Cleveland, Ohio 44101.

Jan. 15-17, Washington, D.C. — **Software Quality Assurance Seminar**,

sponsored by Software Enterprises Corp. Contact: Lesley Toibb, 2239 Townsgate Road, Westlake Village, Calif. 91361. Also being held Jan. 29-31 in Los Angeles.

Jan. 15-19, Hartford, Conn. — **Course on MVS Internal Logic, System Design and Performance**. Contact: Computer Systems Research, Inc., 195 Main St., Avon, Conn. 06001.

Jan. 22-26, San Diego, Calif. — **Fiber and Integrated Optics**. Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Hously to Lead ICN Seminar

WINTER PARK, Fla. — International Computer Negotiations, Inc. (ICN) is sponsoring a four-day seminar conducted by Trevor Hously, data communications expert and author.

The seminar will be held in Denver Feb. 19-22; in Cherry Hill, N.J., Feb. 26-March 1; and in Orlando, Fla., March 5-8.

Designed to keep systems engineers and communications managers abreast of what is new in data communications, the seminar will present an orientation and review of key factors, including a highlight of developments and their applications potential.

The seminar costs \$795, ICN said from 1331 Palmetto Ave., Winter Park, Fla., 32789.

Minis and Micros Topic of Conference

COLUMBUS, Ohio — Battelle Columbus Laboratories will hold a conference Feb. 7-8 to discuss how industrial, plant and process managers can better use minicomputer and microprocessor technology.

A special session will be devoted to demonstrations of minicomputers, software development and debugging systems, as well as graphics and interactive control.

Conference participants will be made aware of the general field of small computer systems, basic terminology and aspects of system procurement and development.

Registration information is available from Susan R. Armstrong at Battelle, 505 King Ave., Columbus, Ohio 43201.

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Part of Analysis System

CPU Helping Fillings Stay Put

By Marguerite Zientara
CW Staff

SAN FRANCISCO — Dental fillings may someday stay in mouths longer and wear better, thanks to a computerized analysis system here that measures such factors, according to Dr. Joseph Moffa, dental research coordinator for the U.S. Public Health Service's Division of Hospitals and Clinics.

Because of the rapid development of dental restorative materials, Moffa said, a need arose for more efficient methods to assess their safety and clinical efficacy. Conventional long-term studies have been complicated by the time-consuming effort required for the development, maintenance and analysis of accurate dental treatment records, he added.

Dental Data on File

The two-year-old computerized system, funded by a National Institute of Dental Research grant, was designed to eliminate all data forms and manual operations associated with the collection of clinical data.

When a patient comes into the Public Health Service Hospital here for treatment, demographic and pathological information associated with the patient is entered into the hospital's data base through CRTs. "As treatment is rendered, the pathology file is debited, so it is always kept current," Moffa noted.

After materials for dental fillings are placed in patients' mouths, pertinent data is coded for the computer. This data includes the manufacturer of material, the date of the filling's placement and the person responsible for placement.

Each material is identified by a 5-digit code number. The 3-digit prefix defines the product name, and the 2-digit suffix identifies the individual batch or variable associated with placement.

For example, one 5-digit code number could identify the material, Dispersalloy, and indicate that it is unpoltished. The system is capable of storing 99 variations of 999 different materials, according to Moffa.

Annual Evaluation

These materials are evaluated on an annual basis. Since the data about the materials is coded, at evaluation time dentists at the hospital can get a list of the names and addresses of all people with a certain material in their mouths by inputting a particular code. This same code prompts a printout of the patients' names and addresses on dental appointment postal cards.

When the patient comes in for evaluation the dentist makes his appraisal on a "blind" basis; he does not know the name of the material that is being evaluated.

For each material, two dentists make separate evaluations about factors such as the color of the material, whether it is wearing away or whether there is recurrent decay.

The computer compares the value judgments of both dentists and, if they agree, the evaluation goes into the data base. If they disagree, however, the system calls to their attention the tooth number, surface and specific criteria of disagreement, so they may arrive at a consensus, Moffa explained.

If photographic evidence is required, the CRT display will list the tooth number and surface to be photographed. Lastly, in the event a patient or a specific restoration is not evaluated, the reason is entered.

Reasons for nonevaluation are divided into three categories: those related to material, those unrelated to material and those associated with patient complications. "We feel the reasons for nonevaluation, especially in the related category, are very important and have been neglected in previous clinical studies," Moffa noted.

The appraisals are made annually for all materials. "At any point in time, we can compare substance A with substance B at three years, for example, and the computer will print out a descriptive statistical analysis of the areas of interest," Moffa said.

Knowledgeable Computer

The system has additional functions, Moffa noted. For example, when a patient is treated, the computer "knows" the patient's name, the name of the dentist performing the procedures and all the procedures performed that day.

At the end of the day, all that vital information is printed on self-adhesive labels that can be affixed to the patient's medical record. In the event the medical record is subpoenaed or needed by another facility of the hospital, the record is always as up-to-date as the computer's data base, Moffa explained.

In addition, in each of the hospital's two operatories — patient treatment centers — a 21-in. video monitor screen is suspended over the patient's chair so the patient can monitor the accuracy of his demographic information.

This process is used both for new patients and for updating the records of previous patients. After verification for accuracy, this information is transferred to the disk storage unit by a single-key operation and becomes part of the hospital's data base of clinical information.

"At any point in time, we can query this data base via the administrative terminal to give us a printout of the names, addresses and telephone numbers of all patients with specific dental treatment needs," he added.

The hospital uses a Wang Laboratories, Inc. Model 2200 computer with 96K bytes of main memory. Three CRT terminals are multiplexed to the CPU. Two are inpatient operatories and one is in the hospital's administrative unit, where it is used for word processing and other statistical backup functions.

With 10M bytes of disk storage, the system makes use of three Wang printers. Two of the printers are 240 line/min printers and one is a 40 char./sec daisy-wheel printer. The daisy wheel carries out word processing functions.

While private offices now use computers for tasks like billing, Moffa remarked, high costs prohibit them from using the technology for patient treatment and material analysis, as does the Public Health Service Hospital. The future may bring such widespread usage, if the prices come down on storage.

A video monitor screen, visible to both Dr. Joseph Moffa and patient, is used to verify the accuracy of data entries made by dental assistant.



DataMaster II

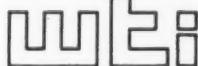


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Editorial

Keep Your Options Open

The key to successful implementation of distributed networks lies in the flexibility of these nets to accommodate the addition of services and equipment.

From the user's standpoint, it is a foregone conclusion that applications will continue to expand and network services will be close behind. So the goal becomes one of finding the maximum capability for today's needs while still leaving room for tomorrow's demands.

It is an understatement to say that the number of contenders in the race to capture the user's distributed network dollars is growing almost daily. Basically these vendors have taken on characteristics that place them into one of four categories:

- The mainframe supplier which provides an architecture that creates an environment dependent on large hosts for efficient operation of terminal-based remote subsystems. An example is IBM with its Systems Network Architecture (SNA).

- The turnkey service vendor which typically evolves from an initial time-sharing network service supplier. This vendor provides local processors at remote user sites that are usually limited to operating on the vendor's network in some way. This group includes General Electric Co., which recently introduced Marklink.

- The "traditional" vendor of distributed DP hardware which has specialized in providing equipment at multiple sites. While most of these vendors provide some compatibility with large central mainframes, the emphasis is obviously

on utilizing a maximum amount of distributed systems. Datapoint Corp. and Four-Phase Systems, Inc. are in this category.

- The carrier which provides the basic transport mechanism with added intelligence that allows the user access to any hosts operating on the public network. This group includes Telenet Communications Corp. as well as AT&T with its Advanced Communications Service.

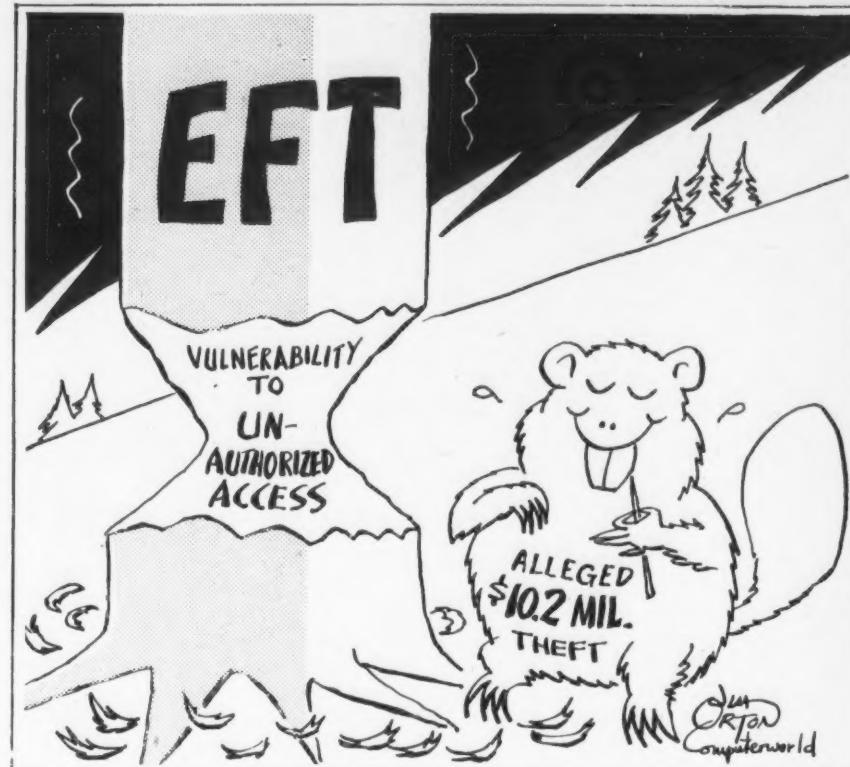
Charting a cost-effective and flexible course through this sea of alternatives is not easy. Each of these approaches in its own way offers the user a solution to current network patterns.

Typically the existing user nets were initially configured around specific applications with specific solutions. As it becomes more cost-effective to move intelligence out to the remote site, it also becomes clear that multi-application nets are the wave of the future.

Further complicating the emergence of multifunction nets is the trend toward combining operations that have been separate within a company. This trend is moving beyond DP into voice, facsimile, word processing and other areas.

All this makes the job of the network manager an extremely complex one if there is to be flexibility to take advantage of tomorrow's corporate requirements.

The integrated multifunction, multitechnology network of tomorrow will be a key profit center in successful companies. Until these nets arrive, users must be careful to keep their options open.



Letters to the Editor

Bigger and Fatter

I have been reading several comments concerning the proposed 9-digit Zip Code and must agree that from a strictly economic viewpoint, such a change would be expensive.

There is, however, one thing that has not been remarked upon in any of the comments which will make the 9-digit Zip Code even more cumbersome. I'm speaking of the big, fat Zip Code directory now used to look up Zip Codes.

How fat will the 9-digit directory be? How many volumes will have to be printed to contain the billions of entries? Someone will have to look up all the new codes in this directory and assign them to the customer records.

R. Buckley

Orange City, Iowa

Two Bytes' Worth

I had hoped to stay out of the Zip Code controversy, but now I feel I must put in my two bytes' worth. The gentleman who suggested, a couple of issues back, that the code be made five alpha rather than five numeric positions so no changes to the file would have to be made must have had a very poor systems analyst.

Most installations with which I have been acquainted use either a packed decimal (three bytes) or a full-word binary (four bytes) field to store the code. The savings in storage media for a multimega entry file is considerable.

Those who choose the route of the packed data will have to change their record definitions (regardless of language) and make a one-time pass of the files to expand the field. On the other hand, those who store in binary can support the additional digits with only a change in the Cobol definitions. (Of course, in both cases there must be an alteration to the print format.)

I'm afraid, however, that my real

fear is in the area of data storage and manipulation. Early in my career (late '60s), I was already running into situations where "near-sighted" programmers had saved only one position for the year, never bothering to consider what would happen 10 years hence.

Don't forget that Jan. 1, 2000 is just around the corner.

I, for one, consider the Zip Code problem to be one of minor but tolerable inconvenience; the dawn of the 21st century is another matter all together.

Joel Kurasch

No Pressure From NCR

During the last three years our institution, the First National Bank of Lake Forest, has purchased used NCR Corp. Century system components — 196K bytes of memory and two Model 657 disk drives — on the open market.

Not once during negotiations to purchase these units did NCR, the account representative or field engineering attempt to apply pressure tactics regarding maintenance of the equipment if purchased through a broker or from another user. Prior to purchasing the equipment, NCR was fully aware of our intentions, and maintenance was provided upon installation without hassles or legal problems.

Our relationship with NCR has been long-standing and mutually beneficial. It is my contention that if a user wants to sit down with NCR's corporate or local representatives to discuss a problem, they are understanding and responsive.

They have proven to be ethical and honorable in our dealings. So if you want to nitpick and dot all the i's and cross all the t's in a contract, go ahead. However, I think it is a waste of time.

William Henderson
Assistant Vice-President
First National Bank
Lake Forest, Ill.

Data Past

Five Years Ago

Dec. 12, 1973

WASHINGTON, D.C. — The U.S. Court of Claims ruled that many copyright notices forbidding computer storage and/or copying of published material might be ineffective and unenforceable. The court found that government users, libraries and other not-for-profit organizations enjoy "fair use" exceptions to copyright liability. The ruling was seen broadening this exception to other data processors who build data bases from published literature.

The computerization of accounting systems uncovered alleged embezzlements totaling hundreds of thousands of dollars in two separate cases.

The larger fraud concerned a Wall Street brokerage house, Cowen & Co., from which Henry Brady, a clerk, allegedly swindled \$170,000 over a period of six years through a girlfriend's account.

In the second case, Marguerite Pells pleaded guilty to the embezzlement of approximately \$15,000 to

\$21,000 over a period of two years from Burke Sale Co. of Seattle, Wash.

Eight Years Ago

Dec. 16, 1970

RALEIGH, N.C. — IBM made available to customer engineers a remote, real-time data bank of maintenance information to assist them in diagnosing malfunctions and supply corrective action data at customer sites. Part of the Remote Technical Assistance and Information Network/370 (Retain/370) support system for 370 users, the data bank was designed to minimize interruptions to customer operations caused by problems with any IBM equipment or programming.

NEW YORK — Armed with a computer study that traced the union's hiring practices, U.S. Attorney Whitney N. Seymour filed a civil contempt action against Local 46 of the Wood, Wire and Metal Lathers International Union. With the information from the computer, Seymour sued the union for allegedly refusing to hire more blacks.

Reader Commentary

TV Makers Should Sell Personal Computers

By Peter R. Newsted

Special to CW

As a computer user and instructor who frequently covets his own personal computer but wonders when the prices will come down and how to supply applications for it, I stumbled upon the following possibility. Perhaps Zenith, Sony, RCA, Panasonic and others are already at work on it.

Because of their size and marketing base, TV manufacturers must be the ones to market personal computers and make money at it. This is logical because the primary appeal of personal computers is playing games, and CRT televisions are required to do this (especially in color).

It is also desirable to have major firms behind software development rather than the cottage industry of "Ma and Pa" computer stores. Having TV firms market and manufacture personal computing gear not only would allow economies of scale, but would also present an image of a good firm standing behind an exotic product. People would feel confident that they could get their personal computers fixed if they broke.

Having the TV industry as the center of the personal computing market has several other ramifications. TV would seem to be the focal point — rather than the telephone — because of interactions with other media. For example, RCA's camera that records pictures on a chip for viewing on a screen would be a log-

ical application extension.

Get Networks Involved

Computer-generated displays — like the ones on some TV stations in the UK — would seem more natural and acceptable when generated by a TV network. In fact, networks themselves might generate programs with which home computers could interact.

This would probably be in only one direction: one would store recipes from the TV network, receive the source code for a new game or play games with a computer-generated situation.

The strategy should be to stress the personal computer's applications and games, not its user-programmable aspect. Obviously, only a very small percentage of TV owners have any interest in programming, but almost all of them would like the arcade and calculator aspects of personal computing, particularly in response to mass media advertising and a national service reputation.

Creative Cassettes

Having larger firms behind personal computing would ensure a wider range and higher quality of applications, probably at a very cheap price. Applications will not sell if they cost more than a board game, pocket calculator, musical record or tape.

Programming itself should be treated as an application. Compilers should come on cartridges or

cassettes like other applications.

In addition to eliminating the programming stigma from personal computing — people will always be afraid of things they do not fully understand — this should improve the quality, variety and availability of computer languages for those like myself who do wish to do personal computing.

Sophisticated games such as chess must also come on cartridges. Imagine the advertising gimmicks: "Our cartridge beats 40% more masters," or "Whizzo backgammon is 10 times more challenging." The marketing potential exists for all ages, especially game-oriented children.

Computer-assisted instruction (CAI) cassettes would be possible. Courses for credit could be put on cassettes, and responses could be recorded, instantly graded — with the grade written on the cassette — and then turned in for credit.

Modified Keyboards

With all due respect to data entry, full keyboards are not the best. Many people do not like to type; many games can use simplified keyboards and joysticks.

Perhaps keyboards that light up with different symbols would be appropriate. The required symbols would be generated by the application or game being run. Different approaches from different manufacturers would be rampant until some won out and standardization set in.

Video cassette development and

marketing seem to be a logical path to follow in developing personal computing capabilities. If people are willing to pay \$1,000 for a video recorder and playback system, they would probably do the same for a sophisticated home computer — particularly if it cost less and was not called a computer.

Standardizing formats would be essential — probably standard or micro cassettes would be used as well as full video cartridges for longer applications, compilers or libraries of games.

Both the video unit and the standard cassette recorder should serve as forms of off-line storage for program code.

One Exception

I see only one exception to the TV industry's wide-ranging expansion into personal computing. This is the traditional area of business DP.

As business computing is more peripherals-oriented, especially with respect to disks and printers, its need for personal computers will still be better served by lower end machines from existing mainframe manufacturers which already understand business needs — such as payables, receivables and general ledger — and recognize the need for hard copy and quick access to records.

Newsted is an associate professor of management information systems at the University of Calgary in Canada.

The Taylor Report NCR's Universal Contract Sparks Continued Debate

By Alan Taylor

Special to CW

My suggestion that NCR Corp. write into its Universal Agreement the guarantees to customers [CW, Nov. 20] cited in the letter from Ben E. Olive, associate general counsel for NCR's legal department [CW, Oct. 30] met with swift response from readers and NCR users. So far I have not heard from NCR.

An article in *The Cooperative Health Care Users' Group Monitor* in March 1977 reported that many user law departments did not like the Universal Agreement. Its headline, "Universal Disagreement," may have been somewhat overdone.

In addition, I discovered many authorized versions of the Universal Agreement exist, so its claim to be "universal" is also somewhat overdone. However, the differences in the versions with which I am familiar are cosmetic rather than substantial.

I even discovered that some NCR users that have not had to change mainframes since the Universal Agreement came out

about 1973 or 1974 are operating without the Universal Agreement and do not intend to sign it at all.

Still, the most interesting thing I found out was what a colleague of Olive's, Robert Conway, thought about the Universal Agreement and its implications. Readers might like to know what other members of NCR's legal department think so they can compare these thoughts with Olive's present and future comments.

In one case, a user argued that NCR had sold him his computer knowing he intended to increase the memory capacity to 256K bytes without future purchases from NCR. Then the user found out he had to buy NCR memory if he wanted to increase his capacity.

Denying the user's allegation, Conway wrote to the NCR user's attorney. He put it this way:

"I believe that you will find the applicable contract in this matter is very detailed and complete in every respect. If your client felt

(Continued on Page 30)

The Human Connection MIS-Communications Effective, Gainful Mix

By Jack Stone

Special to CW

Who would have thought, just a few years back, of linking digital facsimile terminals to a store-and-forward mainframe switch? Or tying word processors to host computers for high-speed document printing? Or using an integrated multiterminal station as an automated office for a distributed DP network?

Well, as described at the Interface West Conference and other recent symposia, such capabilities appear to be just around the corner, again offering a whole new set of opportunities — and challenges — to the management information systems (MIS) organizations.

One question which naturally arises is which department should be responsible for developing and acquiring these advanced systems. Should it be the administrative and communications function which historically ordered office, photocopy and voice communications equipment?

Or should it be the MIS depart-

ment which has long — and hopefully successful — experience as an implementor of complex DP and data communications systems?

Back Into History

A member of a vendor organization who is a former marketing student of mine provided this thoughtful opinion on the matter, based on his many years of selling electronic systems and components. While his experience has been almost totally in the retail industry, I believe his observations are generally applicable:

"To gain a proper perspective of the relationship of the communications and MIS functions within the retail business, we have to go back into history for a moment.

"In the early days, voice equipment was ordered by the building engineer or, in certain cases, by the janitor since phone service was looked on as a utility like electric and heating services.

"As the communications gear became more complex and useful, it became more expensive.

(Continued on Page 32)

Longer Zip Code Only Means Higher Costs

As a long time supplier of computer services to the much maligned health care industry, our company views with great concern the consequences of arbitrary decisions made by government agencies, even when they are made with the best of intentions. This concern includes the U.S. Postal Service's Zip Code expansion, a seemingly minor request.

Almost every new law and its subsequent regulations, it seems to me, inevitably leads to an increase in the cost of doing business. Some laws affect our business directly by the imposition of new or increased taxes; others increase costs indirectly since compliance requires added use of our business re-

sources, be they manpower or equipment.

New rulings made in connection with existing laws and regulations

Reader Commentary

further compound this situation.

Of course, each new health care ruling brings with it the assurance that compliance will either reduce taxes or prevent abuses within the system. Sometimes the regulators claim it will do both.

Regulations are issued, dates for compliance are set, data require-

ments are determined and forms are designed. Sometimes, although rarely, forms flexibility is such that computerized reporting is really a welcome opportunity.

But always, however, instruction manuals detailing reporting requirements and procedures are "soon to be issued and released."

Even in the absence of detailed examples, most will agree that complying with new or changing federal regulations is a major problem and a greater concern. We do comply, but voluntarily? Hardly.

Every regulation which increases workloads bears with it burdens of higher costs which must be passed along to the final consumers of our products or services. Therefore, any-

thing — anything — which might raise our costs we try to avoid.

Since the original implementation of Zip Codes did not hold the line on escalating postal rates, we have little faith that its expansion will do anything except raise costs.

The Postal Service Zip Code request is one we will not adopt voluntarily simply because we are hard-pressed to meet the demands of changing regulations which directly affect our clients. And, they say, more changes are coming. Now, if only we had some specific instructions we could . . .

Kurowski is president of CBA Data Services, Inc. in Chicago.

Letters to The Editor

Data Set Management

In "CPE Effort Eases Manufacturer's DP Functions" [CW, Nov. 27], Ron Gallager, of Bendix Corp. did a nice job explaining the need for computer performance evaluation.

What Gallager failed to explain is that a performance measurement system can only identify the areas that must be addressed to realize optimum performance for both CPU and DASD.

The Bendix Corp. recently purchased two copies of DMS/OS, our disk management system, which is now providing it with tools to take action upon data sets in order to re-configure DASD packs.

Donald A. Murphy
Director of Marketing
Software Module Marketing
Sacramento, Calif.

Not Far Off at All

I found "Capacity Planning Seen Vexing DP Managers" in the Oct. 30 issue a good article that summarized the existing capacity planning problem.

However, I do take issue with the statement that "computer models to do capacity planning are still far off."

Apparently the speaker was not aware of our Scert Performance Prediction System. DP Managers of more than 1,000 companies have used it for capacity planning.

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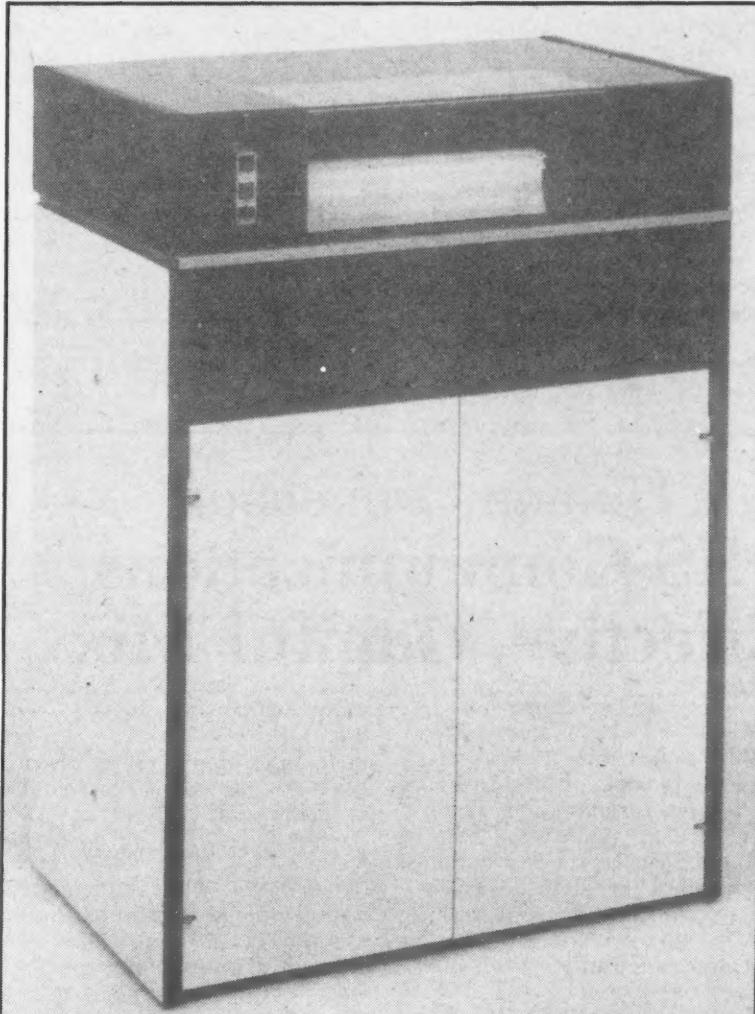
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To Ease Communication 'Systems Planning Ombudsman' Needed

By Herbert Reichlin

Special to CW

This summer, while attending the 25th alumni meeting of my college graduating class, I encountered an experience I thought was restricted to doctors, lawyers, architects and plumbers — my advice was asked.

Although the questions asked by three old friends were different, they all boiled down to pretty much the same thing: "How do we know the DP system they are working on in my company will do what we want it to do and not turn out to be a very expensive mistake?"

I've worked in most areas of the computer industry — as a user, a salesperson, a systems developer in both hardware and software — and I am therefore very sympathetic to those on both sides of the question, the systems developer and the user. The single biggest problem I have discovered is the communication block.

Most end users have never participated in the kind of sequential analysis that systems development requires. They are not aware of the various logic levels involved, the overall goal, the internal and the external requirements, the various lead times, the need for all the separate parts to mesh in a neatly structured whole.

Like Toy Directions

Most systems developers will easily talk of the software and hardware requirements, but they have had little or no experience in product planning, marketing, manufacturing or delivery scheduling.

Their questions are asked in language that may have different meanings, one meaning for themselves and another for the end user. They do not know how to put their questions in the language and context the end user understands.

In many ways this reminds me of the directions that came with the unassembled toys we bought for our children. At times it seemed as if the writer presumed we were master cryptographers. Obviously the manufacturer never did a field test of the instructions to find out if its customers would be able to use them.

Essential Questions

To each of my three friends I put the same set of questions: "Was the overall purpose of the project described in written form and signed off by both you and the systems developer? What documentation method is being used by the

system developer to make sure the system stays on track? In what manner do you get progress reports? What systems tests have been agreed on? How will the transfer to the system be done?"

From all three I got the same startled response — surprise at my questions and little understanding of what the questions meant.

New Job

It was at this point that I thought of the phrase "systems planning ombudsman." The two participants in the project, the system developer and the end user, want to communicate with each other so the project

goals can be achieved. Yet each is uncertain whether they are working on the same problem and trying

industry does need to create this job classification of systems planning ombudsmen.

The consultant fee for this individual could be listed in the corporate accounting records on the same schedule devoted to insurance premiums, because that would be the single essential purpose — ensuring that the end user got the system for which he had contracted. That insurance (or assurance) would be worth a substantial premium.

Reichlin is manager of operations and control for the Governor's Council on Drug & Alcohol Abuse, Commonwealth of Pennsylvania, based in Harrisburg, Pa.

Reader Commentary

to achieve the same goals, and each dreads the thought that when the system goes on-line, it will be a failure.

If I am right, considering my experience and the articles that have appeared from time to time in Computerworld on this topic, then our

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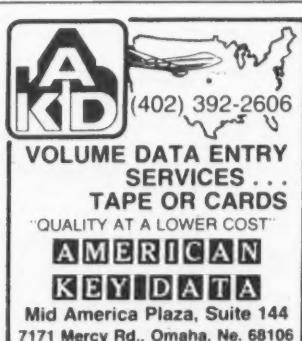
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NCR Universal Contract Debate Continues

(Continued from Page 27)

this aspect of his purchase was so important, it would have been very easy to add a statement to this effect to the contract.

"However, since that was not done, I feel confident that your client is precluded from relying upon such unsubstantiated oral agreements at this time.

"I direct your attention to Section 1 of the Universal Agreement which addresses this very situation. For your convenience, the applicable sentence reads as follows:

"The contract, comprised of this Agreement and the order, shall constitute the entire agreement of the parties and shall supersede all prior agreements or understand-

ings, whether oral or written, and all negotiations, letters, other papers and proposals except as attached to the order or specifically incorporated by reference."

In short, it doesn't matter if your NCR representative tells you something verbally or in writing. You will still have to rely on NCR's goodwill rather than any legal right unless it is written on that original order.

Vague Identities

While Conway correctly interpreted the legal terms of the contract under NCR's Universal Agreement, he failed to mention some important technical points. Unlike Conway, I find the contract lacks

some essential details which make it far from simple, perhaps impossible, for a user to get some vital items put into contract. One problem is that the NCR products are given vague identities.

The actual products have engineering names, which may or may not really identify them, names like "656-102/301 disk drives" rather than "Criterion" or "Century." As is the case with other manufacturing firms, what is underneath the label may change without anyone outside being aware of it.

In fact, two different users receiving what they believe is the same gear at the same time may be getting different items. And there is no way for users to know about this

and protect themselves.

Consider the memory situation. You buy a computer with a small basic memory, and you want to grow. So you find out the cost of the additional memory; if you buy from NCR, it will be standard.

When you get the new memory, you think you will be able to keep your old memory, too. You use it and you are sure you still have your old memory, since you still have the same addresses. Right?

Wrong. At least, not necessarily right. The vendor may have taken out the old memory and replaced it with a larger new one. You have really traded your memory, not added one. And trading in computer gear may be financially dangerous.

The problem, which has been around for about 20 years, is that the easiest way to sell computers is to emphasize their growth capacity, while the easiest way to build and deliver them is to stick with the sizes of memory logically involved (32K, 64K, 129K bytes and so on). Marketing facts fight technical facts, and the result is the description of the items in the catalogs and brochures is often too vague to properly identify what is being sold.

A detailed computer contract should identify the addressing circuitry, memory interfaces and I/O trunk interfaces that will be physically installed, whether or not they are used. Certification and acceptance tests can't tell the user about this.

Such information is important when considering future values. But if the contract cites, for instance, "NCR Model 615-101 with 32K bytes of memory installed," that doesn't tell you much about what you bought.

On the other hand, if the contract read, "Must be sold back to manufacturer if more than 64K bytes needed," then the customer might ask questions the salesman would rather not answer.

Because vital characteristics about the system are left out in favor of a vague marketing identity, I cannot agree with Conway that the NCR contract is "complete."

If NCR customers are going to benefit from those guarantees Olive mentioned, he should write them into the Universal Agreement. I'm waiting to hear that this has been done or else be shown by a hard-nosed lawyer that despite Section 1 of the Universal Agreement, such changes are not necessary.

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Important Benefits Possible DP Should Be Equal to All Corporate Areas

By James T. Walsh

Special to CW

With the advent of computer applications to business controls in the early 1950s, the functional administration of these machines and their output was almost universally placed in the hands of financial personnel. The most obvious connection was their ability to process huge quantities of numerical data and to manipulate this data to produce various reports which made possible easier, quicker and more detailed financial analysis of the business being controlled.

Numbers being the province of the financial people, control of these machines and their operators, in most instances, automatically fell under the jurisdiction of the chief financial officer of the business.

Of course, it wasn't always finance which controlled data processing; sometimes, because of strong functional heads or bias on the part of the top decision maker, other areas controlled it. Almost without exception, however, DP was subservient to some other functional area and did not report to the chief executive.

You will note I say "DP," not "information management," "systems management," "information systems," "information processing" or any of the other current terms. It was, back then, simply data processing.

For some time there has been a trend toward recognizing information systems management as an entity in itself and not an element to be subordinate to another function. The recognition of the real nature of this function has, in many cases, given DP equal status with the other major elements of a business. There has, however, been a lack of publicity regarding this evolution, particularly in medium-sized companies, and I feel more emphasis should be placed on this transition.

Control of DP

Through successive generations of computers, even though on-line applications for operational control in each function of a business became not only a reality but a necessity, control of the DP operations has remained a part of the financial function. Only recently has the real purpose of the function been recognized as being of equal importance to top management as any function of a business, be it manufacturing, engineering, marketing or finance.

Interplay of information between and among the other functional areas justifies transfer of the information management operation from control by one of its clients to status as a partner equal in importance with all its served functions. In this way the function can be allowed its greatest latitude in developing true business systems, serving the special needs of each area and still providing a common data base for generation of the reports needed by corporate management for overall control.

Moving information processing from a subordinate position to an

equal partner with other functional areas can accomplish several important things:

- The stigma of other functions working through the financial department or another discipline to obtain data needed only by the involved unit is removed.
- Consideration can be given by information management to the merits of individual requests for aid.
- The information management operation can more easily acquire professionals from the other disciplines.
- Filtering of requests for assistance to assure fitting into a financial

or other biased view of the operation can be eliminated, and requests can be more easily evaluated on the basis of aiding overall

management will have direct access to the information specialists when deciding the types and degree of data needed for day-to-day control and for special analysis of alternative courses of action or aberrations which arise.

Lower inventories, shorter manufacturing cycle times, more timely production to customer requirements, better control of cost elements, smoother introduction of engineering changes and products, quicker processing of orders, better market analysis and identification of variances, margins and profits are the products of the DP cost cen-

(Continued on Page 32)

Reader Commentary

efforts.

- The managers of the information management operation will be given the opportunity to truly become information specialists in all areas of the business.
- Most importantly, top manage-

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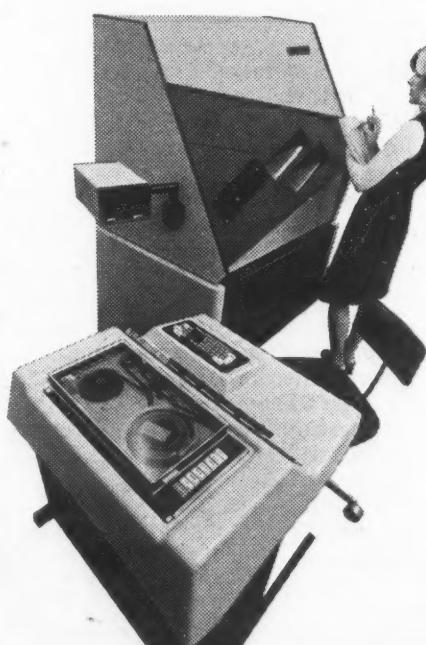
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D



MIS, Communications Merger Seen Gainful

(Continued from Page 27)

But people untrained in DP remained in place, growing more powerful within the company, as they grew into the roles of key decision makers.

"For example, phone service at major retail locations may typically rent for \$5,000 per month. Figuring a 60-month payout, we're talking about a decision worth about \$300,000 being made by, with all due respect, a clerk."

Threat to Autonomy

"In many firms, as the MIS department grew, the communications decision maker saw a major threat to his independence. He saw how MIS could attract investment dollars

from the company for new and expanded capabilities, whereas he was always directed to cut expense. "He was not enchanted with the negative attitudes of the MISers with regard to his newest baby, data communications, which they characterized as 'merely an overhead item to carry information around.' Jealous of the MIS group's advanced technical knowledge, he saw little opportunity to expand his own knowledge of the technology.

"He saw the handwriting on the wall for an ultimate merger of the two organizations, based on two advances in technology: terminal stations and switching devices which were essentially user-programmable and lower cost communica-

tions devices and transmission facilities.

"The programmable devices, as for any DP novice, were baffling to the communications manager. And he felt ignored by top management, which was impressed with the lower cost communications and placed increasing demands on the MIS department — not the communications department — for new online systems."

Battle for Survival

"So the communications manager went into battle for survival. But for the retailers, the battle was short-lived. In most of the big tradionals, the MIS director won hands-down and took over all voice

and data communications responsibilities.

"The major exceptions are several of the biggest retail organizations. In these cases, the identities of the warring factions are intact and a truce exists, but nobody is saying for how long.

"I, for one, believe the merger of the information systems and communications functions is the right way to go. It forces DPers to take the business of telecommunications seriously and apply their planning and systems analysis techniques to cost-effective designs of complex data and voice communications systems.

"The merger is also good for the vendors. It forces us to think in terms of total DP/data communications systems as we deal with the MIS buyer, which in turn, makes us provide better service to our customers," he concluded.

Readers with comments about DP-related management or other people-oriented problems are invited to write to Jack Stone, Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

DP Should Hold Equal Position

(Continued from Page 31) ter.

Many of the above factors are only peripherally involved in the financial area. Each, of course, has an impact on the detail utilized by finance, but the present generations of computing equipment, using online terminals, move the need for utilization of specific data away from finance and more directly into the other functional areas of business. Each has its own need for information in a format unique to that function and each, therefore, becomes as important in its own needs as finance.

Proper Place

By removing information processing from a subordinate position to its rightful position as an information receiving, processing, storing and generation function, standing equal in stature with the other elements of the business, the real potential of this 30-year-old "revolution" will begin to achieve its proper attention and its proper place in the business organization.

I strongly recommend the transfer of information management to an organizational level equal to finance, manufacturing, marketing and engineering. This step will properly position information management to provide needed information systems to all the business functions while maintaining a data base from which management can extract necessary control reports.

It will also provide direct control of this vital function by the chief operating officer without the buffer that now exists. Only in this way can DP truly become a business information processing system entity.

Walsh is director of manufacturing services for Philips Industries, Inc. in Dayton, Ohio.

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NBS Scientist Warns:

Four Obstacles Stymie Queuing Models

By Don Leavitt
CW Staff

PHOENIX — The popularity of queuing models has been growing steadily in recent years, largely because they are economical both in cost and in the view they provide of the essential determinants of system performance, according to Richard F. Dunlavey of the National Bureau of Standards (NBS).

Summing up the "State of the Art in Analytical Modeling" in the November issue of *EDP Performance Review* (EDP/PR), Dunlavey added that queuing models embody increasingly realistic assumptions and produce forecasts "generally within acceptable error bounds."

And, he added, they promise to

fill the need for forecasting tools created in the wake of widespread disillusionment with commercial simulation packages. However, four major obstacles to more general acceptance of queuing network models remain, Dunlavey warned.

Charges of unrealistic assumptions are one of these problems, he said, noting that in order for queuing models to be solved formally, a number of restrictive assumptions must often be made. They assume exponential service times, he said, whereas real systems almost never exhibit such behavior, and they envision no CPU-I/O overlap, but "real systems sometimes have some."

Such assumptions have cast doubts on the models on which

they are based, even though "great strides are being made to overcome the problem," according to Dunlavey.

"Perhaps the most respectable" defense against these charges has taken the form of mathematical research into extending the generality of queuing models by combining modeling techniques that take advantage of the peculiar strengths of each approach and by applying approximation techniques to the solution of more realistic, less assumption-bound models, he commented.

Inadequate Validation

Inadequate validation of the models is another major obstacle to their acceptability, Dunlavey said, taking time to note the "be-

wilderment and surprise" of modelers at the accuracy of their own results.

The "counterintuitive" accuracy of such models has led some to conclude that queuing models appear to apply to a "far more general" class of systems than their stringent assumptions would imply, the NBS scientist added.

On the other hand, he added, some important projections still fall short of desired accuracy and others "are all but impossible" to get.

C.A. Rose and others have often cited the lack of suitable tools to obtain the measures needed to drive queuing models as a major obstacle in their use, Dunlavey continued. These critics argue that hardware and software monitors have been designed to measure bottleneck symptoms directly "but disregard the needs of the modeler entirely."

Dunlavey clearly agrees with that complaint. He noted that "think times, mean device utilizations, selection of 'representative' periods of system time ... require instrumentation and analysis techniques that lie far beyond what the market can support."

(Continued on Page 36)

FDP Rates Printing Under OS

WHITE PLAINS, N.Y. — The Print Load Analyzer (PLA), a Field Developed Program (FDP) from IBM, was designed to enable users in OS environments to develop a picture of their overall printing environments. This should ease printer selection, aid in load balancing and simplify forms usage accounting, a spokeswoman said.

Although other tools have been developed to help the user rate the productivity and performance of a DP system, printing equipment has normally taken second place in performance measurement concerns, she commented, adding that until now the amount of printing accomplished was measured by forms usage and paper inventory control.

PLA is linked to System Management Facility (SMF) data, and that means the study of the printer load can be more detailed than before. SMF data can indicate how much printing is submitted from remote locations and specifically which jobs take longest to print regardless of how much paper or how many forms are used, she said.

The package also can determine which system in a multisystem environment creates the most

printing or which printer, if several are in use, is the most productive.

Reports through PLA show the daily print load at an installation along with a summary of the measurement period, providing tallies of specific forms used. Definition of what activity is to

be measured and for what period is under user control, the spokeswoman indicated.

PLA is cataloged by IBM as 5798-CXY. Monthly license fees (\$90) are waived after the billing of 12 consecutive monthly charges. As an FDP, the package has limited support.

'Microbol' Backs PDT-100 Users

ALTAMONTE SPRINGS, Fla. — Called the first high-level language developed to complement Digital Equipment Corp.'s PDT-100 "intelligent" CRT-based processor, Microbol — from Microbol, Inc. — includes an operating system, language processor and disk management facility.

The package is intended to support business-oriented DP functions, especially by taking advantage of the VT-100 CRT's attributes. These include split-screen scrolling, dynamic cursor addressing and full software control of all screen options, a spokesman reported.

Complete program compilation is not required: Microbol statements are incrementally compiled and interpretively executed. It provides operand substitution for effective use of subroutines and allows nested subroutines and subroutine return stack control, the spokesman added.

Microbol also permits individual and vectored transfer of program control based on function keys, input control keys and

program-generated conditions, he said, noting data fields may be defined and redefined without restriction.

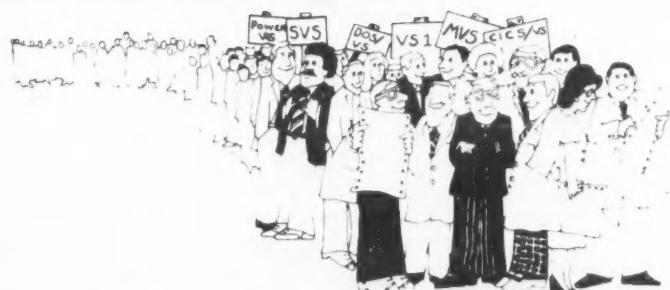
The system supports indexing — "not just subscripting" — and provides decimal point control and numeric field editing, as well as a "simplified uniform indexed disk file facility" for direct access of records by key, he continued.

Microbol operates within 16K words of memory supporting application programs that can be shared by multiple users. The system permits overlapped input and output operations under program control.

The first application of Microbol is an on-line medical system for physicians' offices. Marketed by Microbol Medical Systems, Inc. for \$12,500, it includes the software, a DEC PDT-151 dual floppy disk processor, a VT-100 CRT and an LA180 printer.

More information is available from Microbol, Inc., Suite 118, 711 E. Semoran Blvd., Altamonte Springs, Fla. 32701.

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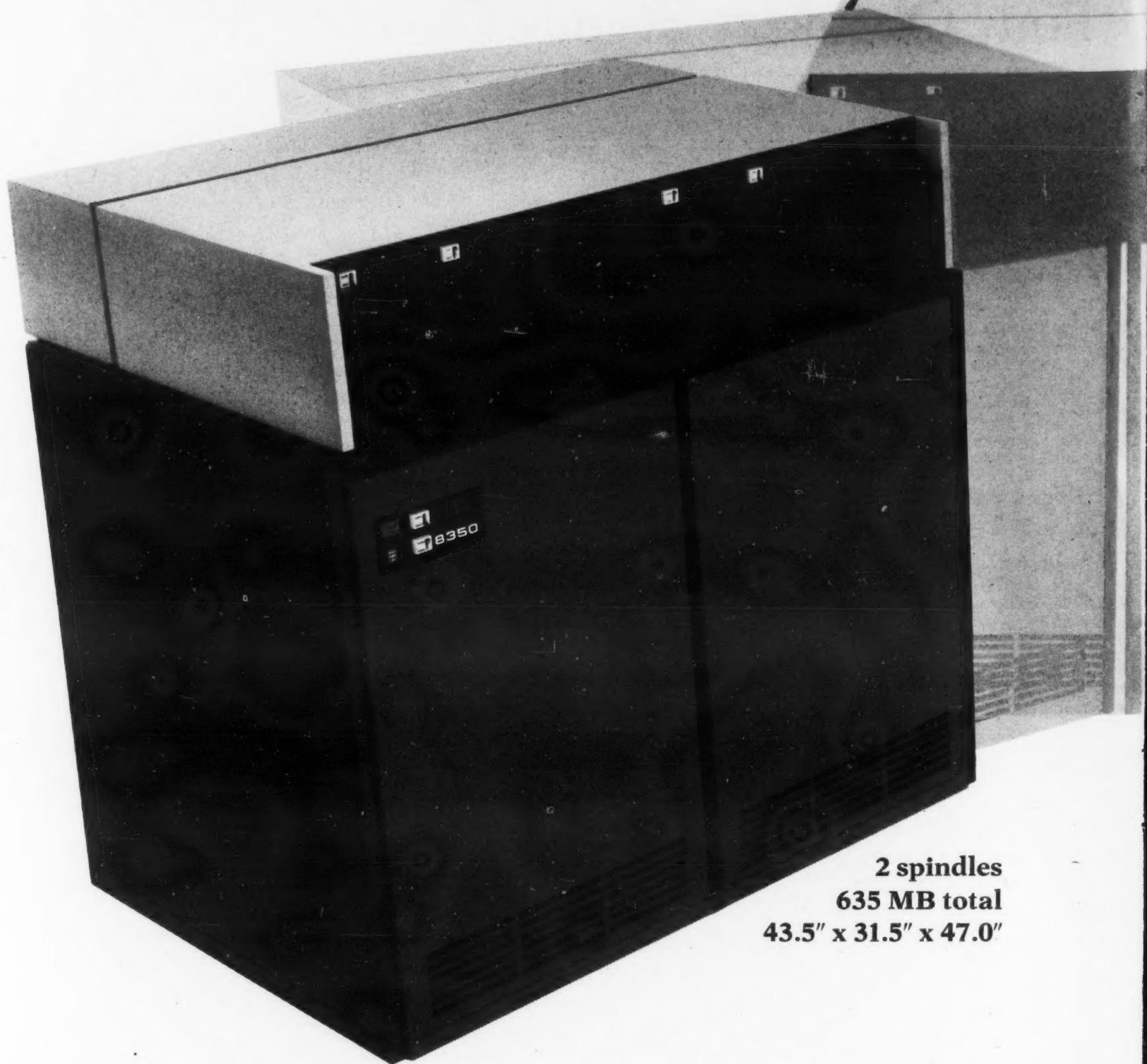
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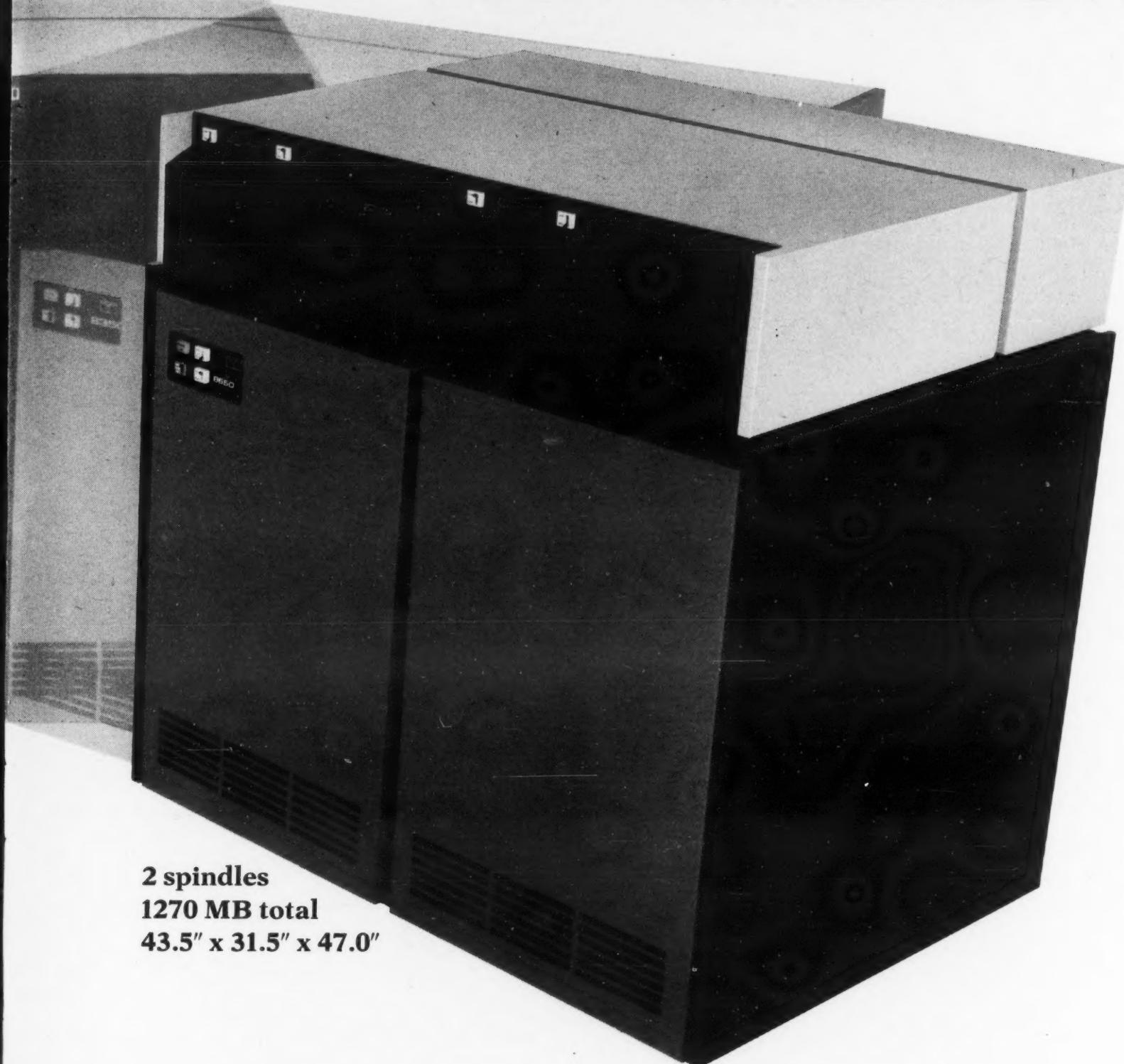
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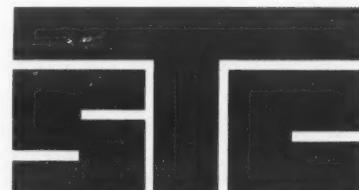
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Personnel Work Supported

CHICAGO — An enhanced version of the Payroll/Personnel System from Cyborg Systems, Inc. now being delivered to users includes significantly better support for personnel work, and the payroll operation was also improved, according to the vendor.

Until the current release, the Cyborg package left the user in "sort of a 'do-it-yourself'" personnel capability, a spokesman volunteered. The expandable data base provided for payroll work allowed users to add personnel-type entries and there was one standard Equal Employment Opportunity (EEO) report. The built-in report writer facilities let users generate whatever output they thought appropriate,

but "it really was up to them to do the work," he admitted.

Now, in the spokesman's words, the vendor "did what any of the users could have done. We designed a number of transactions and created about 25 reports," all focused on supporting the user's Equal Employment Opportunity (EEO), Occupational Safety and Health Administration (Osha) and Employee Retirement Income Security Act (Erisa) reports.

Written in ANS Cobol and operational on IBM, Honeywell, Inc., Univac and Digital Equipment Corp. full-scale systems, the package costs \$35,000, Cyborg said from Suite 2225, 2 N. Riverside Plaza, Chicago, Ill. 60606.

Package Lets Users Develop Forms on VT100 Screen

MAYNARD, Mass. — Digital Equipment Corp. has a series of utility programs for users of its PDP-11 minicomputers or PDT-11 intelligent terminals that are said to permit development of CRT screen equivalents of standard paper forms.

The Forms Management System 11 (FMS-11) allows the construction of customized forms and specialized applications on systems using the company's VT100 terminal. Screen manipulation operations are performed on a field or form basis by form driver subroutines.

Each form can be user-altered without changing the entire forms structuring program, a spokesman noted.

The package involves two operating systems in its customization, one of which is a subset of the other, he explained. DEC's RT-11 operating system is utilized during the software's development and a runtime version called RT² can be used to actually operate the forms programs.

Three Languages

FMS-11 incorporates all of the VT100 terminal's key features into its forms development routine including reverse video, blink, underline, scrolling and a 132-column display.

FMS programs under DEC's RT-11 operating system can be developed in Basic, Fortran or Macro languages; the amount of memory used by the package varies according to the user's application.

FMS-11's development system license costs \$1,350; the system is scheduled for delivery in early 1979 from the company at 146 Main St., Maynard, Mass. 01754.

Obstacles Face Queuing Models

(Continued from Page 33)
ply today.

"Automated instrumentation is an obvious answer but," he lamented, "it is likely to be quite some time before such tools become widely available."

'Rough Going'

Even if good models are available, the challenge of using them effectively can be a major obstacle, the author continued. "The sad fact is, unless you happen to have a recent computer science graduate on your staff who has taken a course or two in queuing theory and computer performance evaluation, you are likely to find your first adventure in queuing models rather rough going."

Queuing theory is quite as difficult as any other topic in advanced mathematics and "unless you feel at home with Markov processes, Laplace transforms and equilibrium state distribution solutions, you may be well advised" to work with one of the packages that have been developed for the nonmathematician, Dunlavy observed.

Having started his article with detailed discussions of some of the queuing models, he ended with comments about some of the packages that are around to help the neophyte.

EDP/PR is published monthly and is available for \$48/year or \$5/issue from Applied Computer Research, P.O. Box 9280, Phoenix, Ariz. 85068.

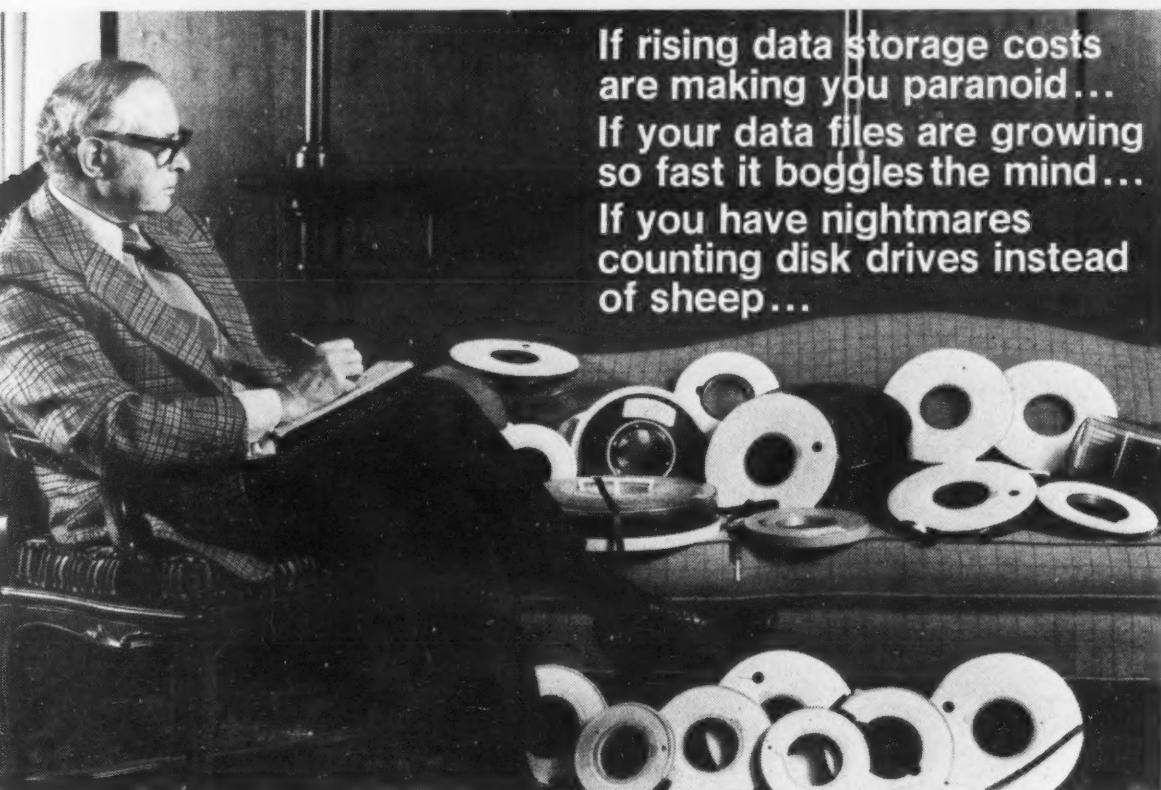
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Built for IBM 370 Users

High Performance Compiler Checks Out Algol

EDMONTON, Alta. — Described as a high-performance compiler that runs on any machine which supports the IBM 370 problem state instruction set and can provide a 1K region of memory, the Full Language Algol 68 Checkout Compiler (Flacc) is now

available from Chion Corp.

Flacc was developed in consultation with Dr. Barry Mailloux, one of the authors of the revised Algol 68 report, the language's defining document. The Chion system implements the complete revised language without exception, according to a Chion spokesman.

It includes "all of formatted, unformatted and binary transput, all of the standard prelude, parallel processing, united modes, long and short modes and heap allocations," he explained, adding that these features are omitted from most implementations.

The checkout features include a symbolic dump, a trace function, profile gathering and a traceback of active locales at termination, the spokesman said.

Checks include use of uninitialized or undeclared values, arithmetic overflows, subscripts out of bounds, scope errors and deadlock of parallel processing, he continued.

Operating system independence for Flacc is achieved by gathering all system-related routines into a single module that provides a rigidly defined interface with the user's environment, the Chion source said.

The prerelease version of Flacc has been extensively field-tested in a number of different environments, he claimed. Flacc operating system interfaces are currently available for OS/VS, MVS and MTS.

The basic checkout compiler system can be leased for 287 Canadian dollars per month; more information is available through P.O. Box 4942, South Edmonton, Edmonton, Alta., Canada T6E 5G8.

Three Programs Converted For Use on Prime Minis

WELLESLEY HILLS, Mass. — Three engineering and scientific programs — described as widely used on mainframes — have been converted to run on Prime Computer, Inc. systems. This is the first time these programs have ever run on a minicomputer, according to Prime.

The Axcess program, first of the converted programs, was authored by the Edison Electric Institute. Used by electric utilities and consultants to perform complex energy audit analyses of building designs to help minimize energy waste, it includes 17,000 lines of Fortran and was converted in three weeks, a spokesman claimed.

HEC2, a 10,000-line Fortran program written by the U.S. Army Corps of Engineers' Hydrologic Engineering Center, is used by civil engineering firms that design and analyze water resource projects throughout the U.S. and Canada. It determines water surface profiles of water systems and is used to estimate flood profiles for rivers or river dam-reservoir systems.

The Storm Water Management Model (SWMM) was created and certified by the U.S. Environmental Protection Agency and used in planning systems to handle overflows of storm water or snow melt in urban areas. It allows engineers to design storm water systems and is in use throughout most of the world, the spokesman said.

This 24,000-line Fortran program was converted to run on Prime equipment in "a matter of days," he claimed. Users interested in the programs

'Syncsort' Now On Calldata Net

WOODBURY, N.Y. — Users considering the acquisition of Syncsort, the IBM-oriented sort package from Whitlow Computer Systems, Inc., now have the opportunity to test the software through the remote computing facilities of Calldata Systems, Inc., which has just made it available under its TS RJE/Batch service.

The sort is extremely efficient for regular production operations and is not on the Calldata service just for test purposes, a spokesman stressed. He acknowledged, however, that having the software on the network, with its "pay-for-what-you-use" charging scheme, does provide a good environment for evaluation.

As many as 64 separate keys may be specified, and records to be sorted may be of fixed or variable length. Syncsort can handle 14 separate data formats and fields up to 4K bytes long.

Calldata is based at 20 Crossways Park North, Woodbury, N.Y. 11797.

should contact their developers, the spokesman said from Prime headquarters at 40 Walnut St., Wellesley Hills, Mass. 02181.

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Longer Zip: Wrong Answer to Right Question

By Stephen L. Robinson

Special to CW

Poor Van H. Seagraves. In the Nov. 20 issue, he lamented *Computerworld's* editorial opposition to the expanded Zip Code. He said he "cannot imagine that a publication covering one of America's most creative and fastest growing industries should focus on programming problems instead of how the computer industry can meet this challenge and help the mailing industries reduce cost."

Yes, Mr. Seagraves, we are creative; that is why we are appalled by what is apparently an absurd approach to a le-

Data Base Corner

gitimate problem. No, we are not focusing only on programming problems; we understand the scope of the complete conversion effort.

Yes, we are interested in meeting challenges, and that is why we speak up with proposals that appear more viable than the solution put forth by the U.S. Postal Service.

Several letters have already appeared in CW and elsewhere offering approaches to achieve the necessary fine division, to the route level, cited by Seagraves. A first obvious approach is the substitution of alphameric for pure numerics. Optical scanners do quite a nice job on alpha, and the increase from 10^5 to 36^5 combinations would certainly be substantial.

If that is not enough, why not con-

sider a 7-character code formed by concentrating the now-standard 2-character state codes to a revised 5-character alphabetic code? As it is, we have an unnecessary redundancy between the city and state fields and the geographic indicators of the Zip Code.

Such a change would yield 50 times 36^5 combinations, which should keep the post office happy for a while. Also, the total cost to effect this change (most likely only a formatting change in output lines) would be substantially less than the cost of a 9-character code.

Speaking of costs, has the post office computed the total cost of this boondoggle? A quick guess tells me that my name and address appears in at least 50 files. I imagine the total number is

quite a bit larger.

A hundred or more would not surprise me (if you don't believe this number, add up all your subscriptions, credit cards, bank accounts and mortgage statements and junk mail which arrive in a month).

But let's be charitable. Suppose the national average is only 25. There are some 200 million people in this country, which projects to five billion address changes.

To estimate the cost of such changes, we should include analyst, consultant and programmer time; computer time; the cost of acquiring new forms; and the cost of misprocessed mail as a result of "learning" errors of the new codes.

If the cost averages out to less than \$1 per change, I would be surprised. (This does not, of course, include the "annoyance" cost to the public of dealing with the new code.)

What Benefits?

So we are talking about a potential cost of perhaps \$5 billion (staggering, is it not?). To be fair, we should look at the other side of the coin, the "benefits" side.

Will our mail be delivered faster? Will the cost of a letter go down? Will the cost of a letter remain the same? Will the cost of the letter rise more slowly than in the previous 10 years, which has seen the meteoric rise to 15 cents?

I believe that most of the data processing community agrees the answer to all the questions above is "no." That is why we do not approve of the nine-digit proposal. Not because we are not interested — we are; not because we don't understand — but because we do; not because we don't want to help — we would like to.

Robinson is an independent consultant operating as S.L. Robinson & Associates, Morrisville, Pa.

Wang Users Offered Accounting Packages

HOLLYWOOD, Fla. — Four accounting packages designed to run on Wang Laboratories, Inc.'s WCS 20 or WCS 30 systems are now available from National Software Marketing, Inc. The current selections include payroll, accounts receivable, accounts payable and general ledger accounting.

Each system is supplied on three floppy disks. One floppy is already initialized for the files "so you can just drop in the disks and the systems are ready to run," a spokesman said.

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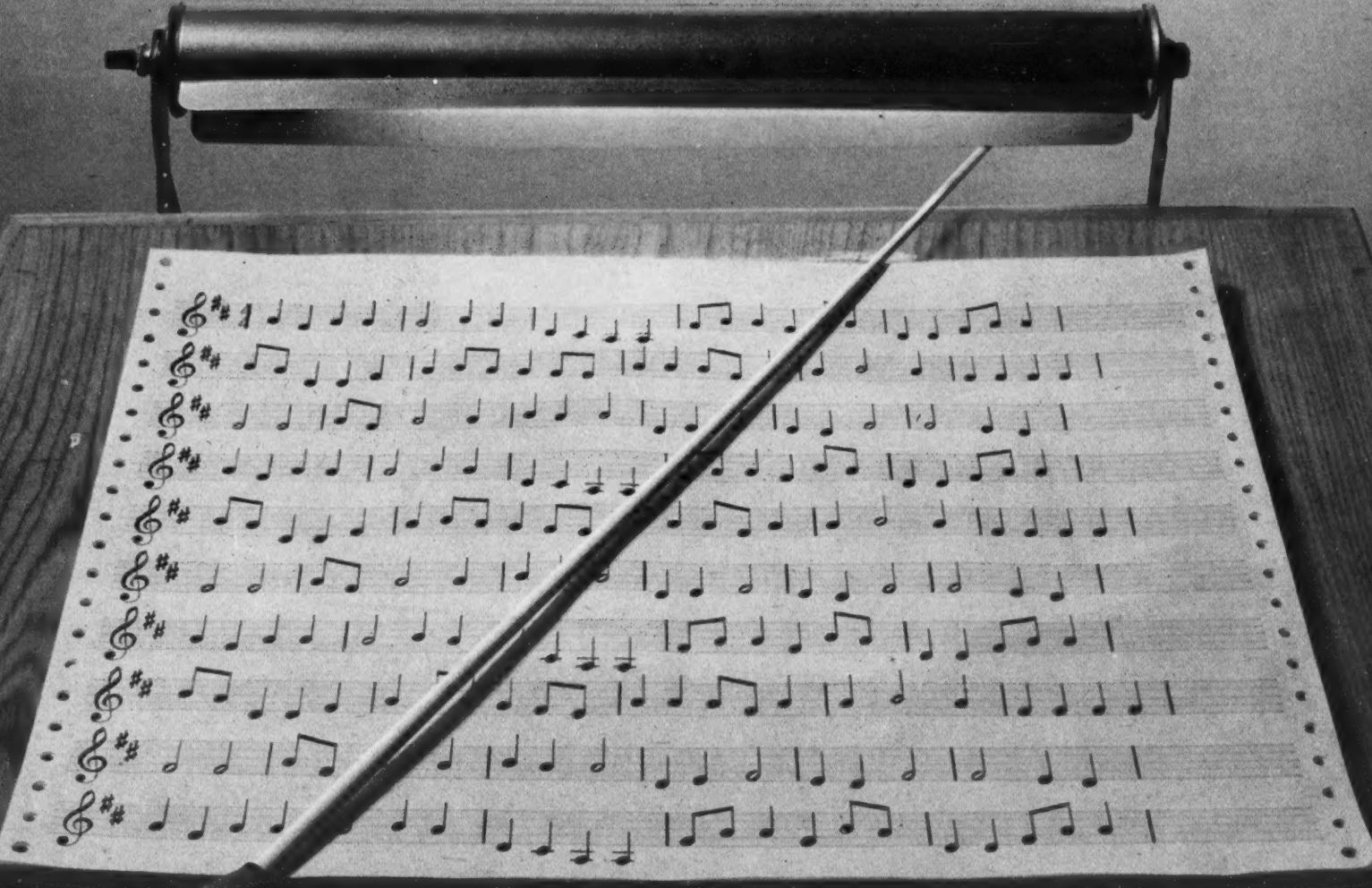
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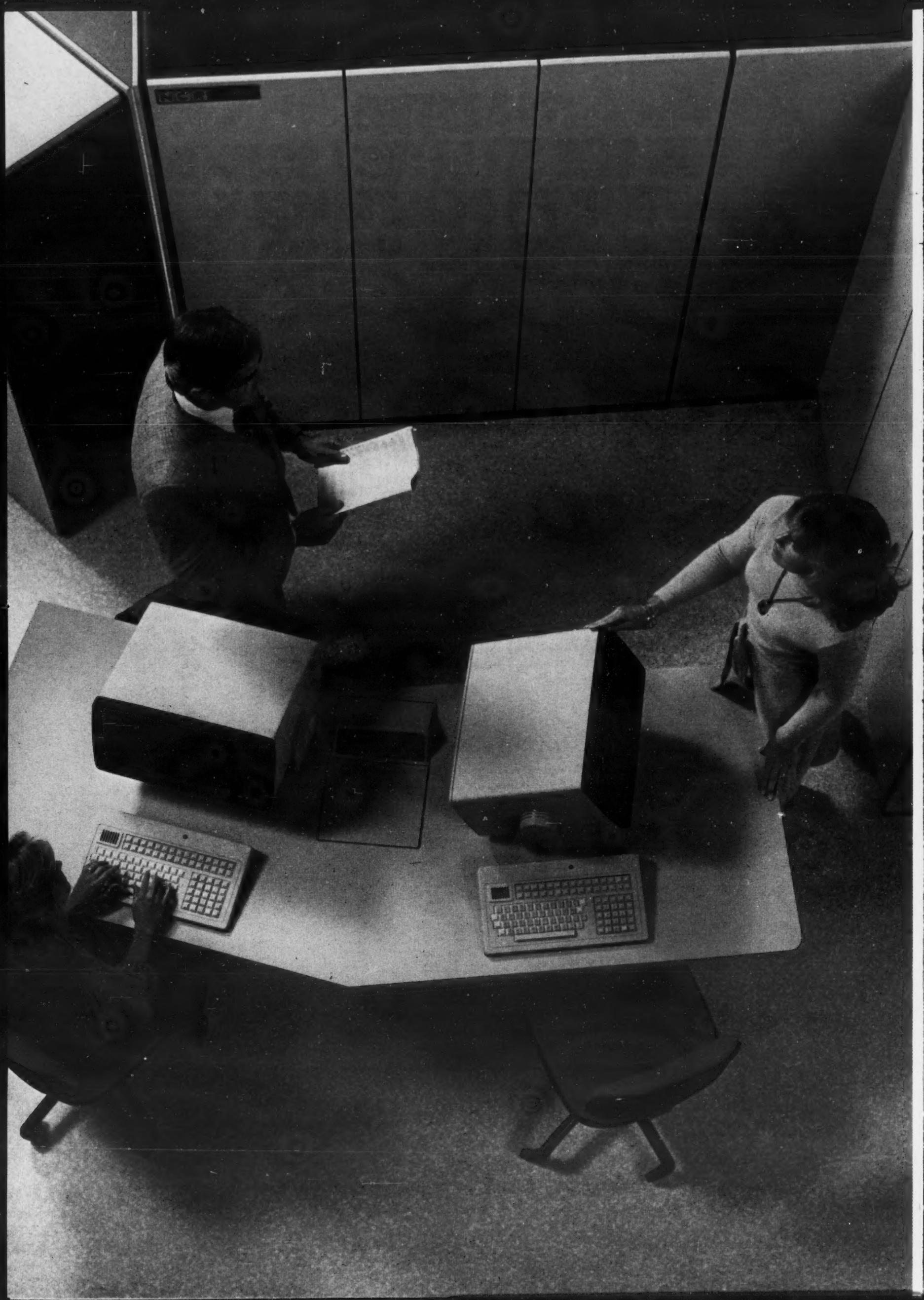
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Development Aided

WELLESLEY, Mass. — An interactive system for on-line program development and word processing, Interact is now available from Cullinane Corp. for IBM-oriented installations.

Described as a renamed Release 6.0 of MENTEXT, which Cullinane took over when it acquired California-based MENTEL, Inc. recently, Interact is said to provide powerful, easy-to-use word processing features that include text editing and automatical formatting.

Interact is compatible with IBM 360s and 370s and supports IBM 3270, 2741 and teletypewriter-compatible terminals. It is currently available for OS or OS/VS users.

The current version costs \$25,000, Cullinane said from 20 William St., Wellesley, Mass. 02181.

Runtime Library Included Series/1 Gets Cobol Compiler

NEW YORK — Users of IBM's Series/1 minicomputer can now acquire a Cobol compiler and runtime library support system, developed by California-based Royal International Systems, from DDP Products, Inc.

The Series/1 Cobol System is said to be a complete package that allows the user to compile and execute Cobol programs conforming to Level

2 of the ANS Cobol 74 specifications. Validation of the system's conformance with Federal Information Processing Standards can also be provided, a spokesman added.

Written in an interpretive instruction set and utilizing the stack capabilities of the Series/1, the compiler is capable of processing a Cobol source program in a minimum Real-Time Programming Sys-

tem (RPS) user partition, he claimed.

Output Listings

Output includes listings of both source and object code, error diagnostics, data and procedure maps and a cross-reference list.

The reentrant modules of the runtime library perform the I/O, data manipulation, arithmetic, table-handling and debug functions required by the executing program. The routines utilize the task work-stack for linkage and local variable storage, the spokesman noted.

The complete Series/1 Cobol system requires a 64K-byte 4953 or 4955 processor with disk or diskette units, a printer and an operator station. Software prerequisites include RPS V1.1, the Program Preparation Subsystem and support for the Indexed Access Method, if indexed files are needed.

The complete package, including the compiler, costs \$9,500 or \$750/mo. An "executive" version, excluding compiler, costs \$3,900 or \$375/mo, the spokesman said from DDP Products at 31 E. 28th St., New York, N.Y. 10016.

DMC Unveils Pascal Compiler For Commfile 130

SANTA CLARA, Calif. — A Pascal compiler, now available for use on DMC's Commfile microcomputer floppy disk system, is said to be a "simple and straightforward . . . standardized" implementation of the language as defined by Wirth's "Pascal User Manual and Report."

This compiler runs under DMC's disk operating system. Pascal source code is loaded onto the Commfile's floppy disk using the standard Editor, after which the compiler produces object code which is executable on 8080 or Z80 microprocessors, a spokesman explained.

The compiler is available to Commfile users for a license fee of \$500, he said from the offices of DMC, a division of Cetec Corp., at 2300 Owen St., Santa Clara, Calif. 95051.

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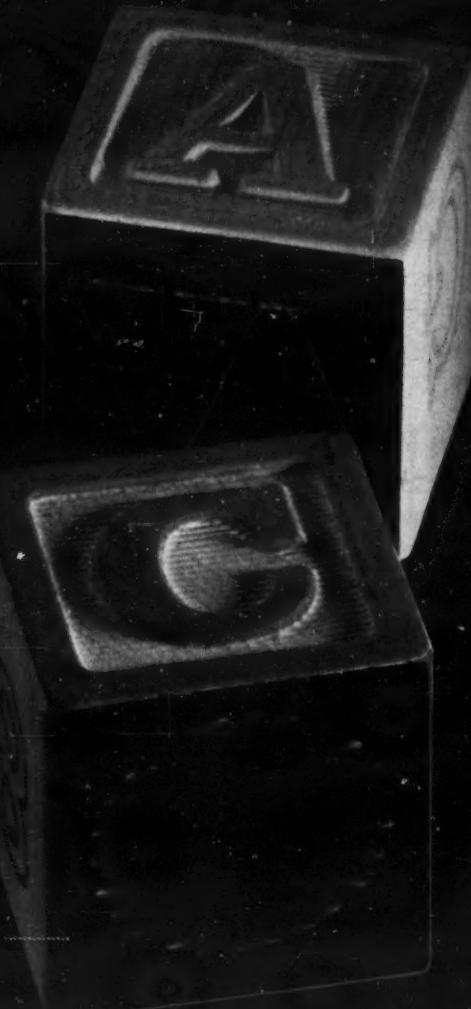
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Crane Developer Scoops Up Manpower, Dollar Savings With Data Control System

Special to CW

SHADY GROVE, Pa. — When a rapid growth company attracts increasing competition, it cannot maintain a position of leadership without effectively reducing waste in manpower usage and high-cost inventories. These objectives were attacked at Grove Manufacturing Co. here with the implementation of a computerized data control system.

Ten years ago Grove had some \$32 million in sales. Today annual sales are approaching \$300 million.

As a specialist in its field, Grove has been the innovator in designing and developing self-propelled cranes with hydraulically telescoping booms. It has managed to capture a substantial corner of the world mobile crane market by fending off aggressive competitors.

To combat increasing manufacturing and marketing costs, five years ago Grove's management approved the installation and implementation of the Manufacturing Control System (MCS), designed to automate eight major facets of the total operation — sales forecasting, engineering data control, inventory control, requirements planning, purchasing, capacity planning, operation scheduling and shop floor control.

For 10 years prior to 1978, just to keep pace with burgeoning growth, Grove's management services department had gone through five separate upgrades in computer systems resulting in its present back-to-back IBM 370 systems, a Model 135 and a Model 138.

Terminal Network

Management services proceeded to implement the present MCS by installing Cincom Systems, Inc.'s Total data base management system (DBMS). Cincom's Environ 1 was added to support a network of teleprocessing terminals for DBMS inquiry and a real-time customer service system consisting of order entry, inventory control, warehouse control and invoicing.

Currently the system supports remote job entry (RJE) from Conway, S.C., with the DBMS and RJE from the engineering department for design calculations utilizing IBM's Conversational Monitor System (CMS). To cope with future requirements, Grove is preparing to implement a tie-in so its subsidiary company in the UK can access the CBMS here via satellite.

After five years' experience with the system, J. Martin Benchoff, president and chief executive officer, said the benefits accruing from the DBMS have been gratifying.

"While the new materials requirements planning [MRP] through DBMS has been very successful, the real motivation in making the change was to improve the bottom line," he noted, adding savings have been realized in every major segment of the DBMS setup.

For example, data-controlled sales forecasting and pursuit of marketing objectives have supported whole goods sales increases of 110% between 1973 and 1978.

Joe Palkovitz, director of material

control, said, "Because of a steady introduction of crane models to cope with market requirements, which contributed to a 65% increase in the number of inventory items just within the past three years, MRP and DBMS have allowed an inventory reduction of 17% in actual dollars."

That cost savings is remarkable, considering the 21% inflation rate Grove inventory experienced during 1975 to 1978. If that factor is backed out, overall inventory dollar reduction reaches 34%.

(Continued on Page 44)

Booklet Describes Software That Analyzes CMS

SPRINGFIELD, Va. — A booklet describing software for analyzing interactive Conversational Monitor System (CMS) performance may deserve attention despite its limited, 24-page size because both its authors are from IBM's Research Lab at Yorktown Heights, N.Y.

The software, called Stream Analysis of Responses by Category (Starcat), is said to analyze sequences of user command strings that have been captured in a special time-stamping CMS console file.

System response times are associated with each string; strings are assigned — by command name, en-

vironment or experimenter-chosen groupings — into categories; and category statistics are reported for one-, two- and three-string subsequences.

Starcat is said to provide a new tool for the quantitative analysis of interactive terminal performance.

Written by Roger C. Evans and Lance A. Miller, "Starcat, a System to Analyze Interactive CMS Performance" is cataloged by the National Technical Information Service (NTIS) as item AD-AO56 835/2WC. It costs \$4 in paper format or \$3 on microfiche from NTIS at 5285 Port Royal Road, Springfield, Va. 22161.

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Firm Scoops Up Savings With Data Control

(Continued from Page 43)

Direct cost and operating savings experienced at Grove Manufacturing and attributable to the MRP application and the DBMS are:

- A reduction of 100 people compared with '75.
- A 75% reduction in shortages of manufactured line items.
- A 90% reduction in shortages of purchased line items.
- Improved efficiency in in-

ventory cycle counts through a reduction in errors.

- A 50% reduction in open manufactured item orders.
- A 19% reduction in the volume of purchase orders.
- A 66% reduction in change notices.

John J. Weber, director of management services, verified that "if Grove management services staffers had not implemented the computerized DBMS, using Cincom's Total

Environ 1 software packages, the two major users of the system, materials control and customer services, would have required a combined staff increase of approximately 160 people — representing a monumental outlay in additional payroll and fringe benefit costs."

John Jacobus, director of customer service, noted that, "to achieve the current 92% delivery factor in off-the-shelf

crane service parts plus the 283% increase in line items delivered to the field today, Grove's customer services department would have had to hire 73 additional people if it had not had use of the system."

Other Benefits

Parts and service benefits have emerged as well. Since implementation of the computerized parts control system,

delinquent parts orders have been cut from 31% to 15% in five years.

Grove greatly improved customer relations relative to parts shipments. To a construction contractor, equipment availability means profit, and if a manufacturer can help him cut downtime to a minimum and get his equipment back to work, he's happy.

Another point of interest is that five years ago, capacity planning at Grove was almost nonexistent. But then a rapid rate of sales growth and an almost continuous expansion of production facilities to meet demand took place.

Capacity requirements planning was developed and interfaced with MRP. This was necessary to determine load vs. capacity conditions at each work center, to keep work loads at reasonable levels and to spot potential overloads that might require either subcontracting or installation of production equipment and facilities.

More Savings

Prior to the system's implementation manually calculated figures could be delayed up to eight days. Now the situation throughout the production operation is analyzed by computer, and a condition report is usable the same day it's generated.

While the DBMS was delivering all these cost savings and vastly improving its efficiency, management services' DP costs went up only 1% over the five-year period. Total costs today are reportedly well below national averages for similar installations.

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evaluations and fine-tuning inside 60 to 70 major centers, working with virtually every IBM system. And that may be better than any advanced degree!

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Does Preprocessing In-House User Trades Service for Net, Saves 70%

Special to CW

CUPERTINO, Calif. — Since switching from an outside service firm that handled sales orders and prepared prospect quotes to a combination of a packet network service and an in-house preprocessor about 10 months ago, Fairchild Camera and Instrument Corp. has slashed its communications and preprocessing costs for these applications by 70%.

Instead of getting a monthly bill from the outside service firm for \$40,000 to \$45,000, Fairchild now spends only about \$12,500 a

month for the same service — \$6,500 to have Tymnet, Inc. handle the heavy communications involved in processing sales orders and price quotes and \$6,000 to perform the necessary data editing and validation in-house on a Computer Automation, Inc. Syfa processor.

"We're getting everything we had before plus the added benefit of being able to implement a standardized approach for both the domestic and international sales order entry process," according to William Brasuell, Fairchild's worldwide telecommu-

nations manager.

Dan Perry, systems manager for Fairchild's marketing distributed processing, said that from an operational standpoint, Tymnet saved his life. "I no longer have to worry about proper network functioning or reliability," he explained.

Objective Set

In mid-1977, Fairchild set cost reduction in communications as a primary objective. Perry suggested going in-house to perform the preprocessing for order entry and finished quotes as a first step toward reducing costs.

Brasuell then began researching the communications requirements of this approach and undertook an in-depth study of possible alternatives to the costly outside packaged service. He brought in Dr. Dixon Doll, president of DMW Telecommunications Corp., an independent telecommunications and management information research firm, to perform a comparative analysis of the options.

Doll recommended that Fairchild switch to a pure communications service for the heavy transmission volume related to order entry and customer quotes provision, and DMW's analysis showed that public data communications networks offered the greatest econ-

(Continued on Page 46)

Railroad Unloads Paper Burden By Taking on Trio of Terminals

MIAMI — A trio of remote terminals has taken over the job of preparing invoices and other time-consuming documentation at a busy East Coast railway, thereby eliminating the need for additional manpower to cope with a growing paperwork burden.

In recent years, escalating rail traffic to the South has provided an expanding business base for the Florida East Coast Railway (FECR), whose primary routes stretch from Jacksonville in northern Florida to Miami and surrounding suburbs in southern Florida.

The line's success has not been without its problems, however. The additional traffic strained the capacity of local railroad stations to keep up with the paperwork needed to keep track of hundreds of railway cars entering the track "pipeline" every day. In the Miami area, in particular, "piggyback" traffic — trailers on flatcars — reached the point where, according to Carl Zellers, FECR vice-president, "if we hadn't done something to speed up the preparation of paperwork, we would have had to put on additional clerks to handle the load — and this is manpower that costs about \$18,000 a year for each clerk when benefits are included."

This prospect was eliminated with the installation of three Raytheon Data Systems Co. PTS-100 CRT terminals and associated peripherals at two of FECR's Miami operations. Tied into the line's IBM System 3 Model 15 mainframe in Jacksonville, the terminals emulate IBM 3270 equipment, communicating with the System 3 at 4,800 bit/

sec over private lines.

The terminals prepare bills (which are printed on a companion matrix printer) for same-day delivery to customers after a shipment is completed; prepare master lists of each train departing from Jacksonville and due for arrival in Miami; and handle customer inquiries regarding shipment progress.

Before the terminals were tied into the line's Jacksonville mainframe, these tasks

(Continued on Page 46)

Former FCC Chief to Keynote Communications Networks '79

WASHINGTON, D.C. — The Communications Networks '79 conference will be held Jan. 30- Feb. 1 at the Sheraton Park Hotel here and will feature a keynote address by Richard E. Wiley, former chairman of the Federal Communications Commission (FCC).

Sharing the keynote platform with Wiley will be Prof. Anthony Oettinger of Harvard University, Dr. Dixon R. Doll, president of DMW Telecommunications Corp., and Jack Epstein of Booz, Allen & Hamilton.

A session dealing with proposed revisions to the Communications Act of 1934 will feature Walter Hinchman, former chief of the FCC's Common Carrier Bu-

reau, Harry M. Shooshan, chief counsel of the House of Representatives Subcommittee on Communications, William Sharwell, a vice-president of AT&T, and A.G.W. (Jack) Biddle of the Computer & Communications Industry Association.

Other speakers will include Dr. Howard Frank, president of Network Analysis Corp., who will discuss network strategy, and John Gantz of International Data Corp., who will speak on distributed data processing concepts.

The conference will include 60 sessions and workshops plus an exhibition of products and services. Details are available from The Conference Company, 60 Austin St., Newton, Mass. 02160.

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Railway Takes on CRTs, Unloads Paperwork

(Continued from Page 45)

were handled manually by clerks at the Miami stations. A number of separate steps were involved, as Zeller explained:

"When a train arrived in Miami, clerks would sit down at a typewriter and prepare a bill for freight charges for a particular customer's shipment, based on its weight, classification and so on, then add a drayage charge for delivery of an off-loaded trailer from our terminal ramp to the customer's

plant.

"The data needed to prepare bills came from files at the Miami stations, so clerks spent much of their time looking up paper files. We knew this was inefficient but, what was worse, extensive manual handling was clogging data entry up at the Jacksonville mainframe.

"Clerks had to mail copies of completed bills to Jacksonville for keypunching into the mainframe. Because of mail delays, consignees sometimes

mailed payment for bills before the billing transaction was entered into the computer's accounts receivable program, which created obvious problems with recordkeeping.

"Furthermore, manual errors originating at Miami railroad stations and keypunching errors, such as transposed digits, led to errors in the computation of the waybill, the transportation document that travels with the shipment."

Communications Snarl

Other documents and data besides consignee charges were snarled by poor communications from Miami to Jacksonville.

For example, the "train consist" — a master list describing each car on a single train, including its order, weight and trailer load — was previously available only in Jacksonville. With the terminals, however, the "train consist" can be transmitted within a few seconds to Miami.

"Our Miami terminal now knows exactly what trains will be arriving, exactly what trailers they're carrying and when they are expected to arrive. This kind of advance information can be passed along to consignees, obviously providing better service, but also eliminating tedious phone calls that were once required to keep track of train movement into local stations," Zeller said.

User Saves 70% by Moving From Service to Packet Net

(Continued from Page 45)

omy. From these networks, Fairchild chose Tymnet because of its low cost and its ability to meet requirements that went beyond the cost factor, Brasuelli said.

Tymnet's projected \$7,000 to \$8,000 monthly cost was less than half the \$20,000 estimate for leased lines and even less than the \$11,000 to \$12,000 estimate for Wats service, which convinced Fairchild of the economy of public packet service.

Fairchild also was attracted by Tymnet's expanding 1,200 bit/sec service, geographic coverage, access to Canadian cities through its interconnection to the Datapac network and its links to international locations via the international record carriers' Tymnet connections.

Strict Requirements

Fairchild's requirements included total terminal flexibility, complete vendor management of network facilities and the error checking, retransmission and rerouting features of a value-added network, Brasuelli noted.

"No other network met all of Fairchild's wide-ranging requirements," he said. "We also became convinced that Tymnet personnel could best meet our strict requirements for responsive and reliable support."

Once the decision to use Tymnet was made, installation was rapid. "Our interface to Tymnet — an eight-port asynchronous Tymcom CP8A — took about half a day to install, which was unbelievable," Brasuelli said.

After the in-house development was complete, the entire switchover of the sales order entry system took about one month and was transparent to the users. "We simply substituted a different phone number to call and advised users of a new log-on procedure," he recalled.

Since converting to the network in November 1977, Fairchild has doubled its Tymnet ports, upgrading from the Tymcom CP8A interface to a 16-port machine last February. In addition, Fairchild has a pending upgrade from the Tymcom to a 30-port interface communicating with two hosts.

Order Entry System

Fairchild's sales orders are received at Mountain View, Calif., for processing

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from nearly 85 sales offices, independent representatives and distributors in the U.S. and Canada. Orders are filled and shipped worldwide from Fairchild's Far East factories and warehouses.

The company processes international sales orders by a different method from that used for domestic order entry, employing separate computers in Milan, Munich, London and Paris.

In Fairchild's order entry system, a sales office interactively creates an order using Tymnet to access the Syfa processor. The CPU validates the order by ensuring that all information about the customer and the product is correct.

Sequenced, edited orders are shipped into the sales backlog on Fairchild's IBM 370/168 for verification daily. The 370 updates the Syfa's customer master and backlog files daily and updates the product master file weekly.

Quote System

In the finished quotes system, a salesman with a potential order calls in a request for price and delivery quotes. For any given product, the marketing and production control offices are often geographically separate. They enter the price and delivery quotes, respectively, into the system and the Syfa CPU assigns a quote number.

When the order is entered, the sales representative references this quote number. Then the order is scheduled and the price is automatically validated.

Fairchild is about to add Tymnet access to VM on its IBM 370/158 for engineering applications. To interface this application, the company is considering adding another eight-port asynchronous Tymcom interface with up to 1,200 bit/sec capability, a Tymcom CP8A/1200.

Fairchild also is considering interfacing Tymnet to IBM's Time Sharing Option on its 370/168 for business programming and may either upgrade the second Tymcom to 16 ports or replace it with a synchronous interface.

"The Tymnet service is super. We are very pleased, and our cost projections are right on target," Brasuelli said.

"Our service has been 99%-plus reliable, and I've had extremely good response from the Tymnet support staff," Perry concluded.

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Video 200 Gets Buffer

MAHWAH, N.J. — A microprocessor-based version of the Video 200 CRT with a magnetic tape cassette buffer that produces formatted data is now being offered by Western Union (WU) Data Services.

Complete formats consisting of a line drawing and 16 different types of display attributes can be displayed on the Video 200's screen by the cassette buffer.

The cassette buffer has a storage capacity of 50,000 characters and

transmits at 1,200 bit/sec. With up to three pages of memory, the Video 200 can store 75-line forms with 80 char./line by scrolling up and down. Editing features include insertion or deletion of a character or a line and erasure of a full page or field.

On a three-year lease, prices for the Video 200 with cassette buffer begin at \$161/mo including maintenance. WU Data Services is at 70 McKee Drive, Mahwah, N.J. 07430.

Datamedia Reduces Prices, Extends Elite's Warranty

PENNSAUKEN, N.J. — Datamedia Corp. has announced price reductions of 4% to 12% on models of its Elite CRT terminal line.

At the same time, the factory warranty was extended to one year from 90 days and an optional second year of warranty was made available for \$100 at time of purchase.

The Elite 3000A microprocessor-based CRT series offers several buf-

fered terminal models with editing; multiple-level, protected formats; APL character sets; Digital Equipment Corp. VT-52 compatibility; and advanced printer control features. Its costs range from \$1,595 to \$1,795 for a single unit.

The Elite 1521A is a full-featured character-interactive CRT with detached keyboard, cursor addressing and printer control; it now costs \$1,250.

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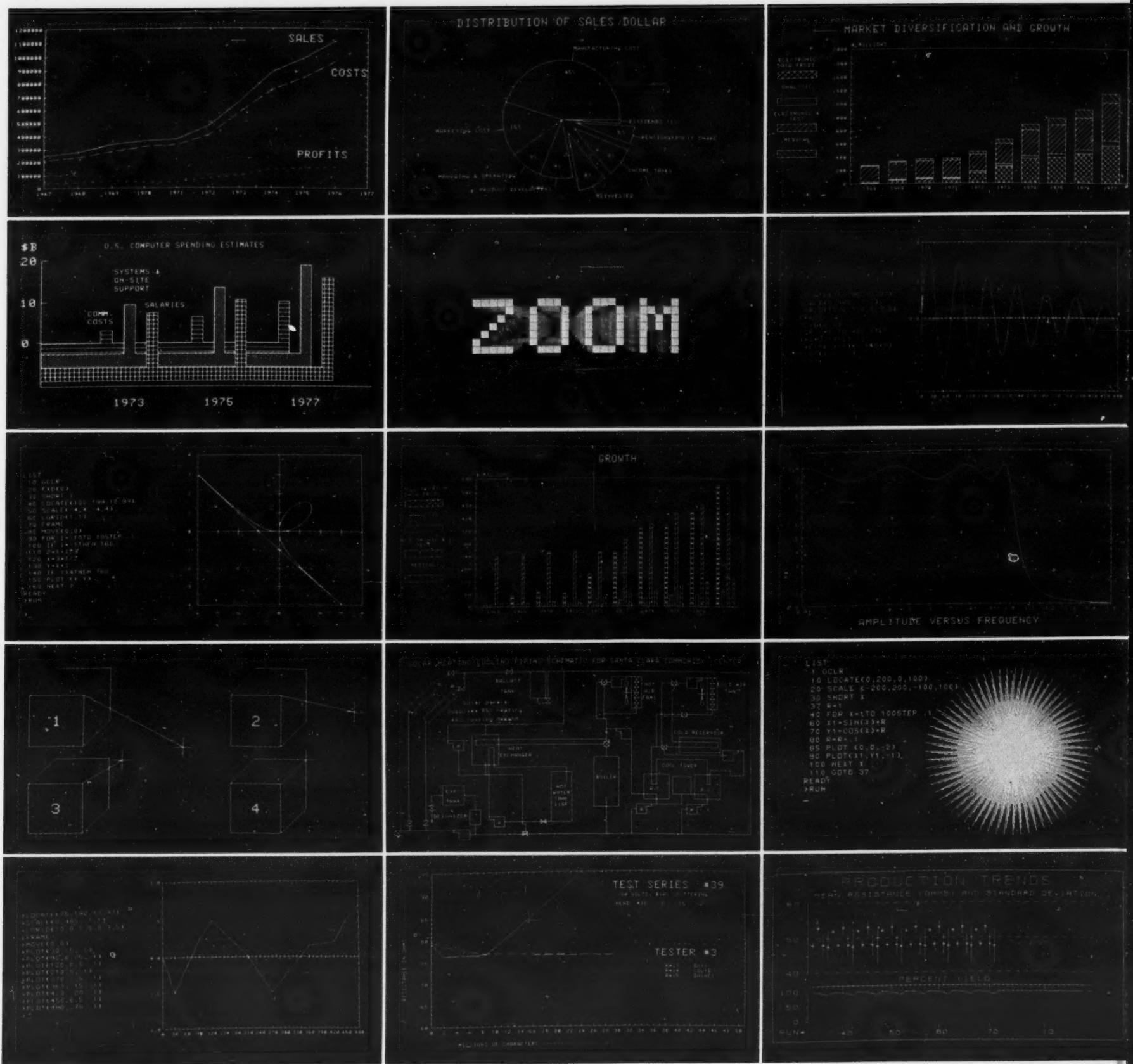
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A picture's worth a thousand numbers.

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Now you can really see your data, not just look at it.

What's more, with the 2647A you can zoom in and out. Pan right, left, up, down. Selectively erase. Shade important areas to make them stand out. Use a rubber-band line to make a quick sketch.

Without any help from your programming department.

It's more than smart.

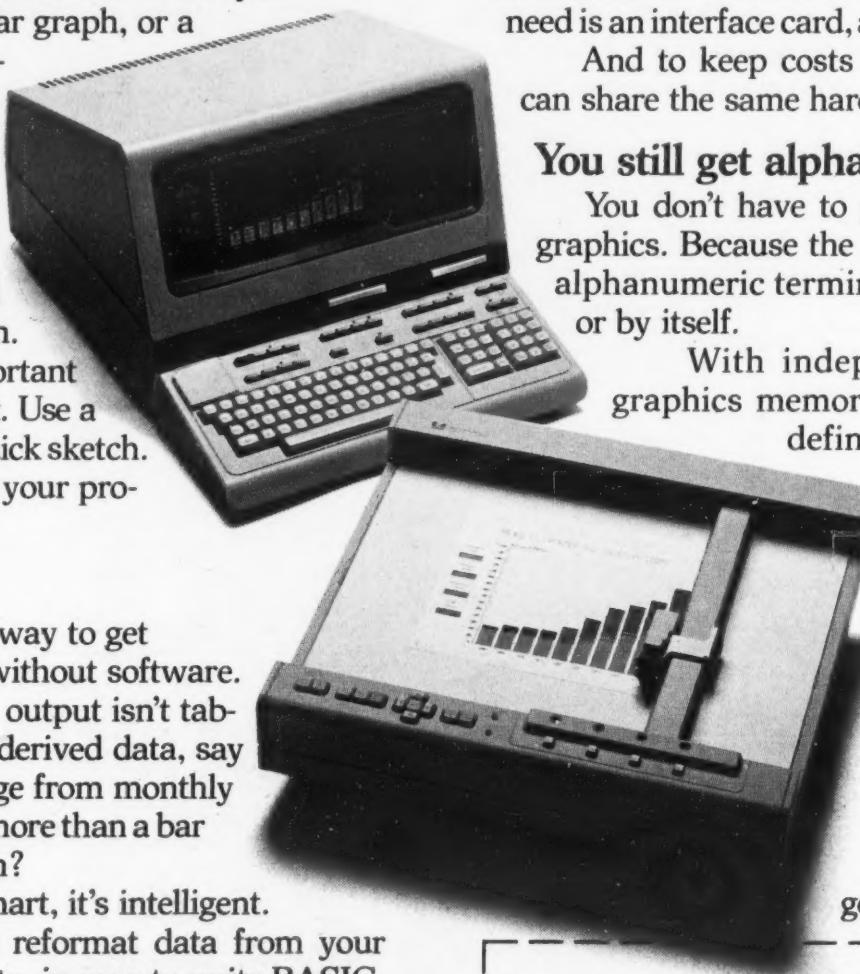
The 2647A's the smart way to get graphics from tabular data without software.

But what if your CPU's output isn't tabular? Or if you'd like to plot derived data, say a three-month moving average from monthly sales figures? Or if you need more than a bar graph, pie chart or line graph?

The 2647A's not just smart, it's intelligent.

You can program it to reformat data from your CPU, or to compute more data, in easy-to-write BASIC. And you can program it in AGL, our high-level graphics language extension of BASIC. Its powerful commands, such as FRAME, AXES, LABEL, LOCATE and PLOT, put sophisticated graphics at your fingertips.

Either way, your program runs on the 2647A without



any help from your CPU.

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And to keep costs down, more than one 2647A can share the same hard copy peripheral.

You still get alphanumerics.

You don't have to give up alphanumerics to get graphics. Because the 2647A's also a programmable alphanumeric terminal for interactive use on-line or by itself.

With independent alphanumeric and graphics memories. Eight soft keys you can define to do several steps with a single keystroke. A bright, easy-to-use, high resolution display. And built-in dual cartridge tape drives for 220K bytes of mass storage.

Best of all, the 2647A with full memory and data communications interface costs only \$8300*.

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Asynchronous Units Linked With 3780-Based CPUs

CAMBRIDGE, Mass. — A standardized interface unit for use between asynchronous devices and host computers supporting the IBM 3780 protocol is available from Industrial Computer Controls, Inc.

The CA12-SIU/3780 is a Z-80 microprocessor-based unit that lets a user interface a wide range of asynchronous devices to a processor supporting the IBM 3780 communications protocol, according to a spokesman.

Available with up to 32K bytes of buffer memory, the standardized unit operates on 2A, 117 Vac, 60Hz and requires no user expertise.

When not performing its data communications function, the CA12-SIU/3780 can conduct a self-test. It can also

Bridging Switch Monitors Data Between Sites

LINCOLN, R.I. — International Data Sciences, Inc. (IDS) has introduced the Model 570, designed for on-line monitoring of data between remote sites.

The Model 570 is installed on-line between two modem repeaters at their digital interface. The unit allows for on-line monitoring of data and timing in both directions.

The unit is capable of operating with modems which have any one of three signal interfaces — CCITT V.24 (EIA RS-232C), Bell 303 and CCITT V.35, according to a spokesman. LEDs monitor the TC, SCR, RD and SCTE signals at these interfaces.

The interface signals of the Model 570 to the data test set are CCITT V.24, he added.

Operational Modes

The Model 570's modes of operation include Bridge and Terminate as selected by a key-lock switch or remote control and an automatic bypass mode which will not affect throughput during any M570 failure condition.

Modems may be internally timed or use timing supplied by the Model 570 at 50 KHz or 56 KHz.

The Model 570 is priced at \$2,800. IDS is at 7 Wellington Road, Lincoln, R.I. 02865.

be remotely tested over phone lines by means of a modem.

Options for the unit include rack mounting, additional memory and changes in communications capabilities (transparent or nontransparent, Ascii or Ebcdic).

The CA12-SIU/3780 is priced at \$3,080 from Industrial Computer Controls, 400 Memorial Drive, Cambridge, Mass. 02139.

DG Users Gain 3270 Support

MEMPHIS, Tenn. — Data Communication Corp.'s Unique TPS-3270 Combo software package reportedly allows IBM 3270 emulation and transaction processing to run concurrently on any mapped Data General Corp. processor. It will support up to 32 CRTs and a variety of other peripherals with total device independence, the vendor said.

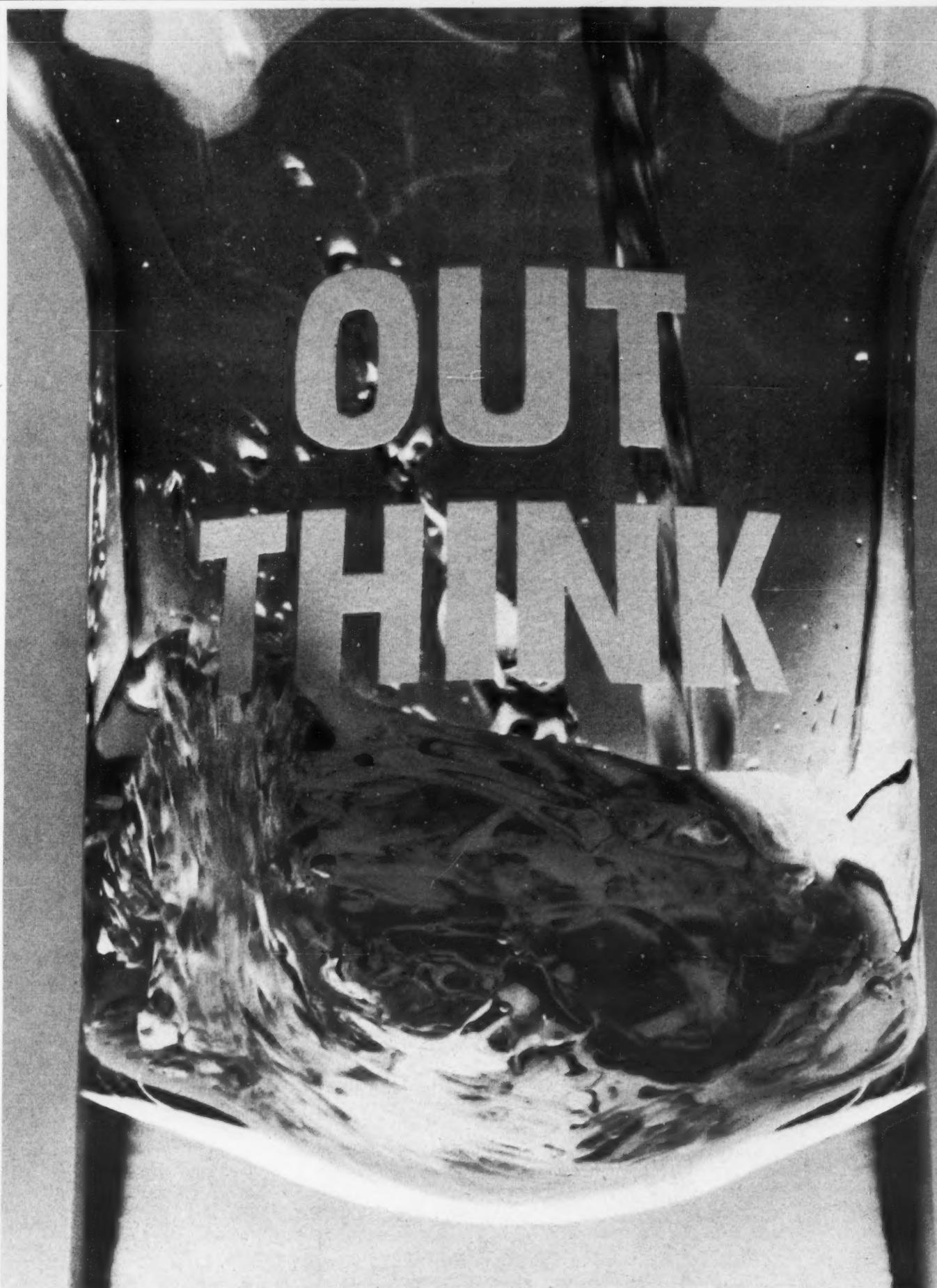
The package gives CRT users the ability to switch from transaction processing to 3270 emulation by a single keystroke, a spokesman noted.

The Unique 3270 is a full implementation

of all 3270 features which can be supported on an IBM mainframe plus concurrent local printing at speeds up to 1,100 line/min.

The Unique Transaction Processing System is a stand-alone, real-time system. It includes foreground/background control structure for multiple program execution.

The Unique TPS-3270 is available now for "under \$20,000" for the complete software package and "under \$10,000" if purchased with hardware. The 3270 software alone is \$4,000 or \$2,000 if purchased with hardware, the spokesman said from 3000 Directors Row, Memphis, Tenn. 38131.



158

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IBM Adds Programmable 3653 POS Terminal

WHITE PLAINS, N.Y. — IBM has introduced a programmable version of the Model 3653 point-of-sale (POS) terminal for the retail store environment that can provide managers with the capability to add functions and increase control of sales and nonsales applications.

The 3653 programmable terminal, operating with IBM's Model 3651 programmable store controller, can be pro-

grammed to perform a variety of POS functions. For example, retailers can change the sequence of functions, check prices in the terminal, collect new information and customize sales slips.

The system also can be programmed for special functions such as layaway, COD transactions, special discounts, currency conversions and service desk operations — including check cashing, check or credit

approval and payments, IBM said.

Three IBM program products for retail customers have been announced for use with the programmable 3653. They are:

- Point-Of-Sale Application/Retail Environment, which provides the basic functions needed to control both sales and nonsales applications in a retail store;
- Point-Of-Sale Application/

Store Data Management, which can be used to build and maintain files in a retail store and for direct store-to-store communications between controllers in chain store operations.

• Subsystem Program Preparation Support III, which gives store programmers the capability of writing programs to run in the store controller or in the POS terminals to provide terminal functions, report

generation and conversational applications.

Presently installed IBM 3653 POS terminals at store locations can be upgraded to the programmable terminals for \$425. Installed terminals and programmable terminals can be operated by the same 3651 programmable controller, IBM said.

The 3653 Model 1P terminal, which is scheduled for delivery in the second quarter of 1979, can be purchased for \$4,090 or leased on a five-year contract for \$106/mo.

The Point-of-Sale Application/Retail Environment program product can be licensed for \$60/mo for each 3651 controller, and the Store Data Management program can be licensed for \$15/mo per controller. The Subsystem Program Preparation Support III program product can be licensed for \$260/mo for each host 370 mainframe.

Interface Links Three Printers

FAIRFAX, Va. — Air Land Systems Corp. has unveiled a microprocessor interface called the MPC-15 designed to provide serial data interface for the Dataproducts Corp. 2230, 2260 and 2290 printers over communications lines that have complex protocols.

To accommodate the data rate of these high-speed printers, the MPC-15 uses a 128-character memory which can be accessed by the printer at its own rate, up to 500 kHz.

The system costs approximately \$1,000 in quantities of 100 or more from Air Land Systems Corp., 2820 Dorr Ave., Fairfax, Va. 22031

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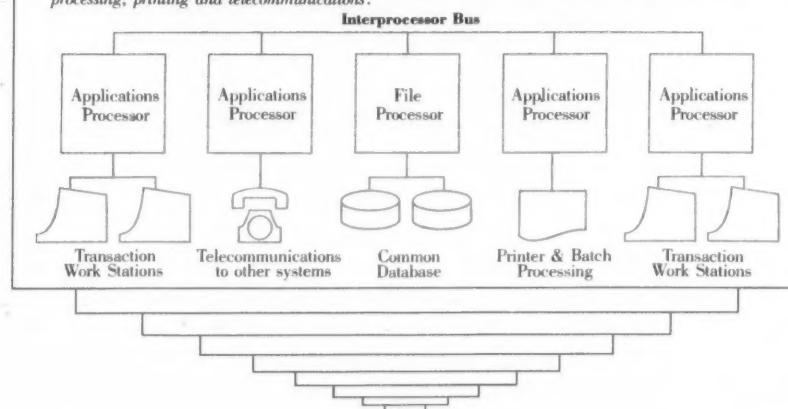
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Telenet Service Expands

VIENNA, Va. — Telenet Communications Corp. has initiated international packet-switched data communications services to Israel, Singapore and the Philippines. The service enables terminal users overseas to connect on a demand basis to computers using the Telenet packet network in the U.S.

International packet-switched service is now available in 22 countries in Europe, North America, Asia and the Middle East. The overseas telecommunications administrations and the U.S. international record carriers jointly provide the interconnection facilities between each participating country and Telenet in the U.S.

In Israel, the Ministry of Commu-

nations provides public dial-up access to Telenet-based computer systems. Charges for the service average \$20/hour, including connection time and traffic charges.

Similar services from the Philippines are available at an average cost of \$26/hour, according to Eastern Telecommunications of the Philippines, Inc., the agency responsible for international telecommunications there.

In Singapore, access to Telenet is available with both dial-up and leased-line arrangements from the Telecommunications Authority of Singapore. Rates average \$22/hour.

Telenet is based at 8330 Old Courthouse Road, Vienna, Va. 22180.

ADI Programmable Unit Emulates Most CRTs

ANN ARBOR, Mich. — The Series 60 Basic Universal Terminal has been introduced by Applied Dynamics International (ADI). With a programmable read-only memory (Prom) that can be programmed to meet most protocol requirements, the Series 60 can simulate the functions and operation of CRT terminals from other manufacturers, the firm claimed.

The Series 60 incorporates two microprocessors: a Z80 which handles the communications I/O and a dedicated special-purpose micro for display refresh.

Direct memory access (DMA) transfer is available from the bus by locking out the Z80. The modular Prom soft-

ware is both linking and relocatable, according to a spokesman.

The Series 60 is available in read-only, keyboard send/receive, automatic send/receive, multidrop and intelligent configurations, in all screen formats from 8 by 16 to 40 by 80. Three circuit boards are used (program microprocessor, video and timing control and power supply), with provisions for three additional boards (for internal memory expansion to 8K bytes and a floppy controller, for example).

Establishing the characteristics of each customer's Series 60 configuration is as simple as defining the program requirements on ADI's configurator and burning a corresponding Prom, the spokesman asserted.

Ascii, Baudot, Ebcidic, Hollerith or other desired standard or nonstandard code conversion is accomplished in the process. The user's program, including control characters, can be redefined at any time by ordering redefined Proms from the factory.

The Series 60 is available as a complete terminal, including keyboard and monitor; as a controller only; or a board set only. Both standard and custom keyboards are available.

Controller-only prices start at \$720, ADI said from 3800 Stone School Road, Ann Arbor, Mich. 48104.

Modem Comes In Assembly Kit

SAN FRANCISCO — Dynamic Devices has introduced an acoustically coupled modem assembly set.

The unit reportedly can be assembled in less than 15 minutes with nothing but a screwdriver and a pair of pliers. No soldering is required.

Since all components are tested, calibrated and burned in, expensive test equipment is completely unnecessary, the firm said.

The coupler will operate in both originate and answer modes, with full- and half-duplex capability. An RS-232C/-20ma interface is standard.

No special telephone lines are required, and the device is fully compatible with telephone company 300 bit/sec equipment, a spokesman noted.

The AC3C is available with a 20-day money-back guarantee. An additional 120-day warranty on parts and labor is provided.

The AC3C will be sold at an introductory price of \$149.95 until Jan. 1, after which the regular price of \$169.95 will become effective.

Dynamic Devices is at 1087 Mississippi St., San Francisco, Calif. 94107.

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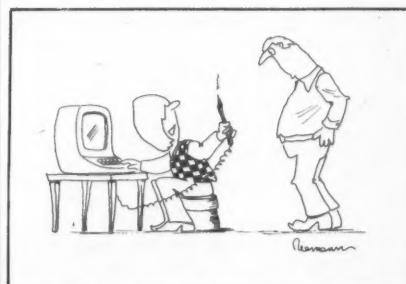
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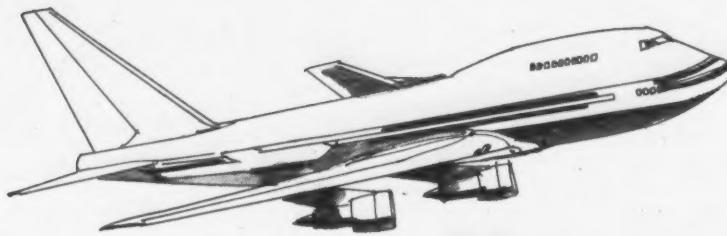
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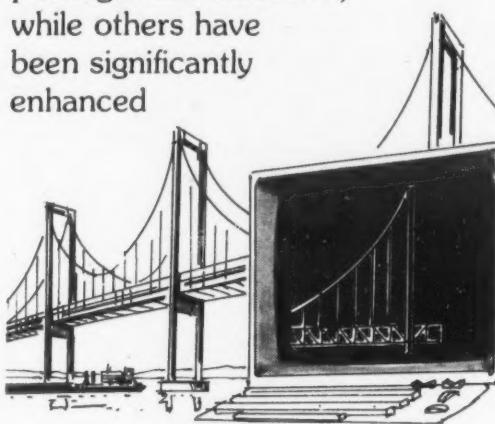
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Auto-Answer Modem Runs at 1,200 Bit/Sec

PALO ALTO, Calif. — Prentice Corp. has introduced a two-wire, simplex/half-duplex, Bell-compatible modem for the automatic answering of computer calls.

The P-202S 1,200 bit/sec modem is a direct-connect unit that interfaces with the two-wire, dial-up switched telephone network through a 97A or 97B jack, Prentice said. A data access arrangement is not required.

Users can connect the P-202S to the switched network in any of three standard modes: programmable, fixed loss or permissive.

Specifications of the P-202S include a serial binary asynchronous data format, -3 to -12 dBm transmit level (programmable by a resistor in the 97B jack), -48 dBm receiver sensitivity and

frequency shift keying modulation, the vendor noted.

The P-202S features full, built-in "at-a-glance" diagnostics, Prentice continued.

The modular unit has a mechanical design matching that of all Prentice

data communications products. Therefore, the rack-mountable card version — with front panel, but without a power supply — fits all standard Prentice enclosures, the vendor explained.

The card version of the P-202S is priced at \$340 in single quantities; the

stand-alone version — card and power supply in a standard 2-3/4 in. by 4-1/4 in. by 11-1/4-in. enclosure — costs \$455 in single quantities, Prentice said from 795 San Antonio Road, Palo Alto, Calif. 94303.

Portable Data Line Monitor Debuts

PALO ALTO, Calif. — A portable data line monitor (DLM) with capabilities for basic line monitoring, transmitting data patterns and messages, terminal rolling and addressing and electronic strip chart recording is available from Arbor Communications Corp.

Billed as a "powerful tool for di-

agnosing problems on communications lines," the DLM contains an integral 5-in. CRT that displays such standard codes as hex, ASCII and EBCDIC. Send/receive data is inverted and character underscoring can be used for event marking, an Arbor spokesman stated.

Monitor starting and stopping can be

controlled from the EIA or control hubs or by data comparison, the spokesman noted, adding that an optional electronic strip chart recording display allows the user to review time-oriented events captured on the parallel TTL data or EIA data set leads or from autocall 801 signals.

The Arbor Model 101 DLM costs \$6,100, the vendor said from 3784 Fabian Way, Palo Alto, Calif. 94303.

GDC Unveils Multiplexer

DANBURY, Conn. — A four-channel microprocessor-based statistical multiplexer has been introduced by General Datacomm Industries, Inc. (GDC).

The TDM 1240 assembles and transmits variable-length data blocks composed of only the actual data characters from the individual channels so that it can achieve a typical multiplexing efficiency of 200%, the firm said.

The unit was designed to provide data transparency to all information bits, including parity, in each transmitted data character, according to the firm. Because of this, the TDM 1240 is not restricted to use with only alphanumeric printing devices and the capability to flag errors encountered in local distribution is not sacrificed.

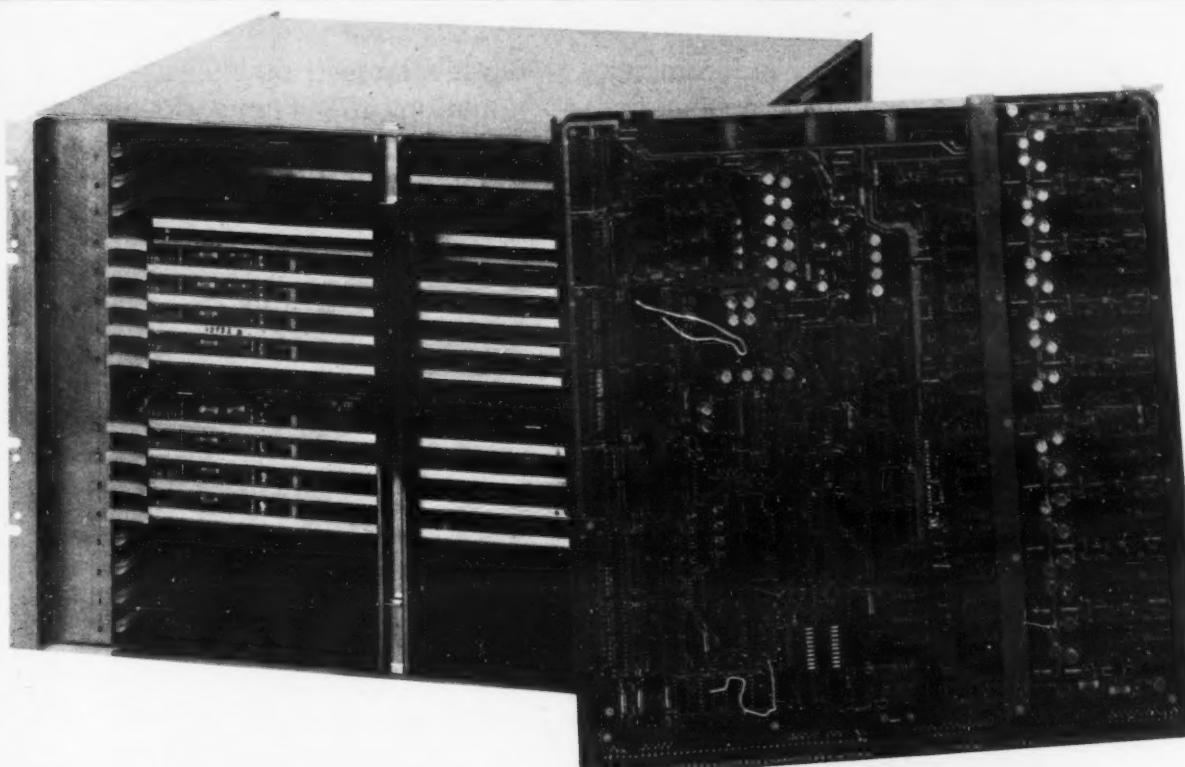
The GDC TDM 1240 costs \$2,480 from General Datacomm Industries, Inc., One Kennedy Ave., Danbury, Conn. 06810.

Remote-Batch Unit Prints 80 Columns

SEATTLE — Dataorder II, a programmable key-to-cassette remote-batch data entry terminal, will be shipped with an 80-column instead of 48-column, electrosensitive printer beginning Jan. 1, International Entry Systems, Inc. (IESI) has announced.

Integrated in a 26-lb case are an 8080 microprocessor, 16K-byte random-access memory, keyboard, 40-character alphanumeric display, the printer, a cassette recorder and RS-232 communications interface, IESI said. Programming is done on the unit with Quick, a high-level data entry formatting language; Extended Basic; and asynchronous and synchronous communications configuration programs.

Dataorder II costs \$3,495, the vendor stated from 408 N.E. 72nd St., Seattle, Wash. 98115.



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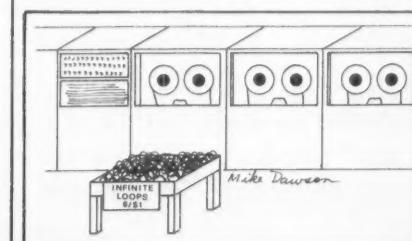
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512KB 7/32 Chassis
Dataram-manufactured 7/32 chassis with eight 64KB Memory Modules provides 512KB memory expansion for your 7/32 minicomputer. The Memory Bank Interface board is also available from Dataram.

Interdata Bulk Core Disk Emulator
And now, Dataram's BULK CORE is available for Interdata users who want to go beyond the normal addressing boundaries of the host minicomputer. BULK CORE does it at much higher speeds and is all-electronic, and that means no moving parts. And a 15 1/4" BULK CORE system offers 2.0 megabytes of peripheral storage.



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	200 x 200	322 secs	376 secs	263 secs
	400 x 400†	2555 secs	3774 secs	1840 secs
Sharable Development Software	editor	Yes	No	Yes
	linker	Yes	No	No
	assembler	Yes	No	No
	compiler	Yes	No	No
Small (under 40KB) Development Modules	editor	Yes	Yes	Yes
	linker	Yes	Yes	Yes
	assembler	Yes	No	No
	compiler	Yes	No	No
Fast Compiler	(over 1500 LPM)	Yes	Yes	Yes
Optimizing Computer Technology		Global	Block	Global
Custom Microcoding Development Software		Yes	No	No
Price		\$89,900	\$187,000	\$1,000,000

*U.S. price includes Interdata Model 8/32 system with 512KB of memory, 10MB DISK, 800 BPI tape, Carousel console, Operating System, utilities and FORTRAN VII.

†Requires larger memory.



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Bits & Pieces

Printer Series Offers Up to 1,200 Line/Min

MELBOURNE, Fla. — Hetra Computer and Communications Industries, Inc. has introduced a series of medium- to high-speed printers that reportedly incorporates several state-of-the-art features.

The Hetra 3300 series includes printers rated at 600-, 900-, 1,000- and 1,200 line/min; they are available with interfaces for IBM 360 and 370 mainframes, most mini-computers and the Digital Equipment Corp. 2020, a spokesman said.

Up to five carbons can be printed on the devices, and forms can vary in width from 3.5-to 19 in. The printers accommodate either an electronic vertical forms unit or 12-channel paper tape unit for forms control.

Printing pitch is 10 char./in., while line spacing is selectable to either 6- or 8 line/in.

Prices for the units vary from \$12,500 for a 600 line/min printer with a standard mini-computer interface to \$30,000 for a 1,200 line/min unit compatible with the DEC 2020. The price of a 360/370-compatible version has not been established, the spokesman said from 1151 S. Eddie Allen Road, Melbourne, Fla. 32901.

Stand-Alone OCR System Puts Out 5 Page/Min

NORRISTOWN, Pa. — An optical character recognition (OCR) system from Scan-Data Corp. is said to accommodate a wide range of DP and distributed DP applications and to be capable of reading five standard pages per minute.

The Scan-Data 1150 can read alphanumeric OCR-A or OCR-B fonts and, optionally, numeric handprint. System features include an alphanumeric font, a magnetic tape unit, on-line display for reject handling, automatic feeder, two-pocket stacker and an RS-232C communications interface, according to a spokesman.

The purchase price of the stand-alone unit with OCR-A or OCR-B is \$41,000; with the numeric handprint option, it is priced at \$48,000. On a five-year lease, the unit costs \$1,150/mo, including maintenance; the handprint option costs an additional \$190/mo. Scan-Data is at 800 E. Main St., Norristown, Pa. 19401.

Independent Memory Held Best Buy for IBM Users

By Anthony J. Coppola

Special to CW

Burgeoning deliveries of IBM 30 series systems will force a repetition of recent economic history in the prices of memory: The prices of IBM memory for outmoded 370 systems will plummet.

Despite this, however, other factors will continue to make the economics of independent memory ownership a better investment.

The pricing history of IBM 360s and out-of-production 370s — assuming it is repeated — provides a good clue to why this is true. Although newer systems are typically leased from IBM, the balance swings more and more toward ownership as time goes by.

Statistics compiled by International Data Corp. (IDC), a market research firm, indicate that nearly 97% of the 360s extant in 1977 were purchased; this compares with industry estimates of approximately 20% ownership when the 360 line was introduced. More than half of these systems were user-owned, while the remainder were owned by third parties such as leasing companies and brokers.

Stable, Not Static

Although the 360 market is stable, it is not necessarily static. IDC figures show that between 1973 and 1977, the amount of memory per average system increased nearly 50%.

Since IBM no longer builds memory for this market, the increase must have come from independent memory makers. Rather than fading away, then, the 360 base is increasing, at least in terms of capacity.

Three factors have contributed to this growth: IBM's own marketing philosophy, the nature of companies owning 360s and the inherent advantages of using independent memory.

IBM's policies encourage independent memory suppliers. The introduction of systems typically offering greater capacity and better price/performance ratios encourages the users who lease older systems to migrate to the newer ones.

The systems abandoned by these migrating lessees typically move into the used marketplace, usually at a substantial price reduction. For example, a 370/145 costs about \$1 million new but about \$220,000 used. And IBM does not sell systems to its leased base,

nor does it lease to its purchased base.

With newer IBM systems offering greater capacities and improved performance, why would anyone want to use an old system? The answer has to do with the type of company that uses 360s and 370s. Basically, there are three general categories of users, each of which has its own operating requirements.

In the first category is the Fortune 500 type of company. It may have multiple 370 or 30 series systems, particularly to handle on-line DP. At the same time, however, it may have

(Continued on Page 60)

With CPU, Service Tracks Each Vehicle In Corporate Fleets

EDEN PRAIRIE, Minn. — The use of computers by auto manufacturers is an old story, and the use of microcomputers in cars is a very new story. Somewhere in between lies the use of computers to track service and financial data on autos, particularly the fleets of cars maintained by many companies for their personnel.

"If corporations with fleets of company cars or trucks maintained and disposed of their vehicles the way consumers do, productivity would drop and expenses and financial terms would become unmanageable," according to John A. Lever, vice-president for information services at Gelco Corp., a service transportation company here.

"Today, while most typical fleet purchasing arrangements have simplified the selection, financing and the selling off of the vehicles, few operations take care of all the details that occur in between," Lever added. "Gelco uses a computer for almost every facet of its truck, trailer and auto fleet leasing and management operations.

"Our system backs up Gelco's customers throughout the life span of the leased vehicles. Our support starts with the choice of make and models and continues through the financing, maintenance and eventual resale of the used vehicles," Lever noted.

The company's Honeywell, Inc. Level 66 Model 60 system tracks data on more than

(Continued on Page 68)

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Independent Memory Seen Best Bet for Users

(Continued from Page 59)

one or more 360s for specific applications.

The software has been developed and personnel have been trained. The company wants to extend as long as possible the life of the system to amortize its associated costs.

At another level is the medium-sized company that may have leased a 360 at one time from a third-party leasing company but has decided to convert the lease to a purchase. Its primary concern is to get maximum performance out of the system. It wants to use the system to its full capacity and forestall the necessity of moving up to a larger, more costly system.

At the third level is the small firm that buys a 360 in the used marketplace. This is usually the company's first large mainframe and represents an upgrade from a smaller system or a move from a time-sharing service.

The mainframe represents a major capital outlay and, because this type of user is extremely cost-conscious, it wants to maximize the use of the system at the lowest possible operating costs.

Of course, there is still another major user of used systems — the third-party leasing company. With its capital tied up in "obsolete" systems, it needs to maximize the return on its investment dollar. This means enhancing the performance and capacity of the system so it comes close to the newer systems, which allows the lessor to offer the system at a substantial cost savings over the newer systems.

Inverse Price Relationship

The challenge to the purchaser of used systems, therefore, is to maximize its investment. Whether an end user or a third-party leasing company, the goal is to extend life and improve the performance of the existing system. Adding memory with performance enhancements is the most effective way to accomplish this.

The traditional price relationships between independent memory suppliers and IBM is turned around in the used computer market. IBM memory — since its design is several years old and uses older, slower, often less reliable technology — typically drops in price as a function of time.

However, it is not uncommon for memory supplied by an independent to hold its value. It is also easier to dis-

Tape Records To 6,250 Bit/In.

GRAHAM, Texas — Graham Magnetics, Inc. has introduced a magnetic tape that is said to offer significant advances in the tape coating and in the dispersion of the magnetic particles on the tape.

The Epoch 480 is certified by the manufacturer for all bit densities through 6,250 bit/in. It is guaranteed for 20 years.

The coating process reportedly offers better head-to-tape contact, as lessening wear on both the tape and the read or write head of the drive.

The price for a reel is "in the \$16 range," depending on quantity and shipping, a spokesman said from Graham, Texas 76046.

	256K BYTES		512K BYTES		1M BYTE	
	EMM	IBM	EMM	IBM	EMM	IBM
POWER CONSUMPTION (KILOWATT/HOUR)	1.4	6.7	2.3	13.4	2.5	26.8
HEAT DISSIPATION (BTU/HOUR)	4,774	25,300	7,820	50,600	8,000	102,200
FLOOR SPACE (SQUARE FEET)	8.74	17.16	8.74	34.32	8.74	59.9
MONTHLY OPERATING COST	\$67.76	\$338.54	\$111.25	\$677.08	\$117.71	\$1,354.15

Operating costs are based on the following assumptions: memory runs 700 hours per month; electricity costs 3.47 cents per kilowatt hour (typical for the Los Angeles area); and dissipation of 12,000 BTUs requires one ton of air conditioning using 3.5 kilowatt hours.

pose of memory made by an independent supplier.

In a typical situation with a new IBM system, the price for independent memory starts at approximately 70% to 80% of the IBM price. As more independents enter a specific market, price competition widens the gap to 40% to 60%.

As soon as IBM stops actively building a system, its price for memory in the now "used" market plummets. In some cases, used IBM memory is about 50% of the price of independent memory.

For example, in the 360/65 market, 512K bytes of IBM memory costs approximately \$20,000. The same amount of independent memory will cost \$45,000 to \$50,000.

Inherent Advantages

With this inverse price relationship, one would expect that users would prefer to buy IBM memory. After all, even if IBM may not be building memory for a specific machine, any memory in service is still supported by IBM.

However, the opposite is true. Experienced users recognize that independent memory is a better value. There are sound business reasons for this.

Independent memory has inherent competitive advantages over IBM memory, and the cost of ownership of independent memory is substantially lower than IBM memory. Also, third parties (dealers) prefer to sell. And many users have found the cost of IBM attachments sometimes cost more

Cabinet for Printouts Features Locking Top

W. BABYLON, N.Y. — Vue-Fax, Inc. is offering a printout security cabinet for housing output binders with built-in hangers.

Incorporating a top that locks, the unit is said to provide 31.5 in. of filing area for 14-7/8-in.-size output. Ball-bearing casters allow the unit to be moved from place to place.

The security cabinet sells for \$190 from Vue-Fax at 101 Alder St., W. Babylon, N.Y. 11704.

than the memory — a situation not true with the independents.

When an IBM system is introduced, the independent memory supplier not only has a price advantage over IBM, but also offers features and enhancements not available from IBM. These features and enhancements take on added significance in the used memory market since they improve performance and extend the life of the system.

Among the typical features and enhancements offered by an independent memory supplier are:

- Memory capacity that exceeds the stated capacity of the system. It is not the technical limitations of the CPU that determine the maximum capacity of memory, but rather IBM's marketing strategy. Therefore, by using independent memory, a user can increase the throughput of an existing system at a lower cost than upgrading to a faster, more expensive CPU.

With independent memory, a user can usually get at least twice the IBM stated capacity — in some cases, much more.

- Speed enhancements. It is possible to achieve faster processing times with independent memory. Taking advantage of this higher memory speed, system throughput can be increased without any additional main memory.

- Smaller memory increments. When a user adds independent memory, he can usually add it in smaller increments than IBM offers. This means he can better control the amount of memory on his system. This eliminates the situation of excess memory capacity on a system.

- Field upgrading. When a user moves up to a larger system, IBM comes in and replaces everything, which makes upgrading a costly investment. By contrast, most independent memory is field-upgradable to the larger system.

Also, most independent memory suppliers will offer upgrade and conversion provisions in their lease agreements to further minimize memory costs.

- Total support for used memory. Actually, the term "used memory" is a misnomer. It actually means equip-

ment that has been leased to others.

However, since the independent memory supplier is still building and supporting the used market, a user who orders memory is actually getting new or refurbished memory. This includes new components and the manufacturer's warranty, which is the same as a new memory warranty.

Lower Ownership Cost

Besides these features and enhancements offered by independent memory suppliers, it costs less in terms of energy and floor space to use independent memory. Even though the initial price of IBM memory may be lower in the used market, the long-term operating costs will be higher.

For example, a 370/155 is 50% more powerful than a 370/148, yet a Model 155 used memory costs only 50% that of a new 148.

At Electronic Memories & Magnetic Corp. (EMM), we recently completed a comparison of the cost of operating our memory and IBM's on a 360/65. This comparison is shown in the box above. A glance at the table shows the operating costs of the independent memory are significantly lower than those of IBM memory.

By extending the life and performance of older 360 and 370 systems, users are realizing direct benefits. They are amortizing the cost of these systems over a greater period of time. At the same time, they are increasing their machines' capacity so they come closer to the newer systems. This means users can avoid the high capital investment required for a new system.

Whether the 370 used market will parallel the evolution of the 360 used market remains to be seen. However, similar patterns have developed within the 370/145 and 370/155 product areas.

If it does occur, maybe someday in the not-so-distant future, rather than bragging about a new computer system in an annual report, a company will brag about extending the capabilities and uses of its existing system.

Coppola is director of marketing with Electronic Memories & Magnetics Corp. in Hawthorne, Calif.

Reporters Can Still Meet Deadlines

Typesetting System Gives L.A. the Latest News

LOS ANGELES — Reporters on the *Los Angeles Times* can now incorporate late-breaking developments into their stories and still meet publication deadlines, thanks to a computerized typesetting system that significantly cuts production time.

"Our typesetting procedures have changed drastically during the past four years," according to Joe Malcor, superintendent of the electronics department at the *Los Angeles Times*. "For many years, an operator would typeset manually on a Linotype machine. The Linotype produced characters in hot lead form, and the operator was responsible for designating column width, hyphenation and line justification. Display ads had to be cut and laid out by hand."

Others Inadequate

"We had tried two other systems that produced text copy on photographic paper, but one required loading a paper tape with typesetting instructions into the machine, then printed only one character at a time. The second system could only print one or two columns per sheet because the paper wasn't newspaper-wide," Malcor recalled.

In 1974, the *Times* began using computerized photocomposition for typesetting to replace those long and tedious procedures. The typesetting system relies on an IBM 370/158 mainframe.

Peripheral equipment includes three Autologic, Inc. APS-4-100 typesetters, two APS-18 communications controllers and two Evans & Sutherland Computer Corp. digitizing systems, as well as seven T8000 tape transports and six D3000 disk drives manufactured by Pertec Computer Corp.

"We have approximately 100 CRTs for text input throughout the paper's different departments," Malcor said. "The operator enters the text into the CRT with coded directions for typesetting, such as column width and typeface. The IBM 370/158 then takes care of line justification and hyphenation, which frees the operator from making those decisions."

"A line printer produces copy that is returned to the editor for proofreading. After editorial approval, the text is sent via a direct line from the mainframe to the APS-18 communications controller, where it is received by the disk drive."

"Finally, the APS-18 deposits the text into the typesetter, and the typesetting process continues. The photocomposed copy of the article is then sent

through the remainder of the printing procedure," he explained.

The typesetting process for display ads varies slightly from the process for articles. It is based on a digitizing system that was designed especially for the *Times*.

"The digitizing system allows us to put the ad text on a video display board, where an operator can manipulate the typeface and line lengths and can make any changes or additions desired," Malcor said. "When he is satisfied, the ad is entered into the typesetting cycle in the same manner as an article. Ad layouts are no longer done by hand."

"All articles and display ads pass

through the disk drives that maintain the operating program for the typesetting system," Malcor said. "But with a paper as large as the *Times*, we have found that a backup system is a necessity."

"For this reason, we use a magnetic tape-based system where the operator can input the story onto magnetic tape that is then transferred to the tape transport on the APS-4-100 to be typeset."

"The computerized typesetting system has saved the employees a significant amount of time. We have been able to push back editors' deadlines and still get the paper printed and distributed on time," he pointed out.

"It now takes an average of four minutes to run one page of the *Times* classified section through the entire typesetting procedure. The stock page takes two and a half minutes. Typesetting itself takes only seconds."

Many of the decisions that were made by the *Times* personnel, such as hyphenation and line justification, are now made and carried out by the computer system, Malcor noted. Because of this, the paper has been able to redirect employees to other tasks.

Future plans? "We don't have any plans to expand this system to other applications. But the *Times* is a progressive newspaper and plans could change," Malcor concluded.

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THE EVIDENCE: The 1977 Auerbach report on INTERCOMM. Here's the bottom line: "Why are we so high on INTERCOMM? Mainly because it has been in the forefront of technology for so long."

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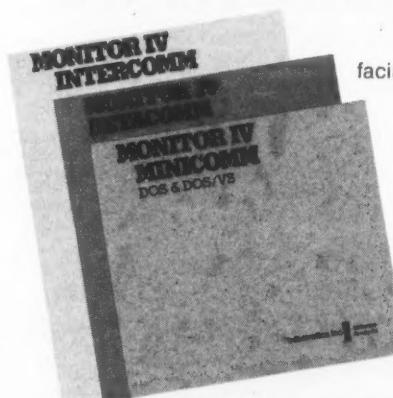
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Line Sensor Guards Units on 115 Vac Lines

PLEASANT HILL, Calif. — Calex Manufacturing Co., Inc. has introduced an ac line sensor designed to safeguard equipment attached to a 115 Vac line.

The Model 829 is used as a window comparator, according to the company. A voltage variation, either above a preset high or below a preset low, will cause the unit's output to be switched off normal, thus protecting sensitive equipment from over- or under-voltage conditions.

The unit is available in two models: the relay-output Model 829-R and a transistor output Model 829-T. Both can be used to detect a low-voltage condition ranging from 90- to 110 Vac, and a high-voltage condition ranging from 120- to 140 Vac, a spokesman noted. In addition, the two units can respond to changes in average line voltage in as little as 100 msec, the spokesman added.

The 829-R costs \$68 and the 829-T, \$89, from the company at 3355 Vincent Road, Pleasant Hill, Calif. 94523.

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—FORTUNE, 1978

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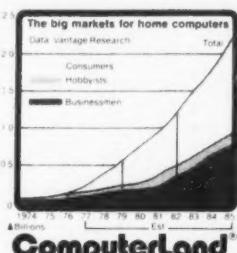
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CPU, Peripheral Replacements Let Cycle Maker Rev Up Throughput

MILWAUKEE — One of the country's leading sellers of heavyweight motorcycles, AMF/Harley-Davidson Co., Inc. (H-D) here, recently revved up its computer throughput by replacing its IBM communications equipment, disk drives and mainframe with Memorex Corp. CRTs and disk drives and an Intel Corp. plug-compatible CPU.

By replacing an IBM 370/145 with an Intel AS/4; IBM 2314 and 3330 disk drives with Memorex 3675 drives; and IBM 3277 communications gear with Memorex 1377 CRTs, the company was able to increase its throughput by a factor of 2.5 over its previous configuration, according to Ron Durchslag, manager of computer operations for the company. "We achieved this with no increase in hardware costs," he noted.

H-D's computer center processes a variety of applications for manufacturing, marketing, sales, service, accounting and parts and accessories distribution. Before settling on its current configuration, the company went through several conversions.

The first step was swapping the mainframe for the Intel 2M-byte unit. After this, the disks were replaced, then the CRTs.

Savings of \$20,000/Mo

"To have upgraded our IBM mainframe, terminals and disks to get the kind of performance we are getting with the new system would have cost us in excess of \$20,000 a month more than we're now paying. The Memorex equipment contributes greatly to these savings," Durchslag said.

H-D converted to Memorex CRTs for several reasons, he added. "Our users liked their style and ease of use, and our analysis showed they are the most error-free of all the terminals we investigated."

Durchslag decided on the Memorex 3675 drives, with a storage capacity of 400M bytes and a data transfer rate of 806,000 byte/sec, mainly because of their price/performance.

"The IBM drives performed quite well," he noted, "but we've actually had fewer problems with the Memorex modules. In addition, we've been able to use the Memorex two-channel switch option, which increases throughput by reducing I/O wait time."

H-D also uses a Comten, Inc. front-end processor to control the company's teleprocessing networks, a tape subsystem and two high-speed printers. For data entry, a Four-Phase Systems, Inc. minicomputer, with 14 Four-

Phase terminals, front ends the mainframe.

The company uses six teleprocessing networks for data transmission within the home office and between the home office and the various manufacturing, distribution and parts and accessories warehouses both in Wisconsin and Pennsylvania.

The 35 on-line Memorex 1377 terminals give users instant access to the various data bases, allowing a wide range of applications from order entry and verification to credit checking, sales projections and parts inventory.

Of the firm's various data base applications, the sales and parts and accessories systems are among the most advanced. The sales system uses two data bases: dealer services and vehicle order entry.

The dealer information data base contains all pertinent dealer information, while the vehicle order entry data base

contains all dealer orders. The latter data base, with information on vehicle type, date needed, special options, colors, quantities and so on, contains the information needed for the beginning of the manufacturing process.

As the dealer due date for a particular vehicle approaches, orders to build are transmitted over the manufacturing network to the factory in York, Pa. When completed, the vehicles are shipped directly from there to the dealer. Shipping information, along with registration and vehicle identification information, is transmitted to the Milwaukee headquarters. The invoices are sent to the dealer from Milwaukee.

"With the complexity of processing and communications that our applications involve," Durchslag said, "reliability and speed are important for customer service. We feel our current system ensures both."

Free Literature Offered

Several vendors have announced the availability of free literature that might be of interest to DPers.

• Tally Corp., 8301 S. 180th St., Kent, Wash., is offering a booklet called "How to Select the Printer You Need." The booklet is said to cover available types of medium-speed printers and features to look for when purchasing a unit. Intangibles influencing cost-effectiveness and best value are also discussed, the firm noted.

• A Booklet from Compu-

draft, at 1818 Market St., Philadelphia, Pa. 19103, discusses interactive computer graphics. The brochure enumerates the benefits of interactive computer graphics in a variety of drafting applications, the company noted, and details some historical aspects of this relatively new technology.

• Floating Point Systems, Inc., P.O. Box 23489, Portland, Ore. 97223, has issued a brochure discussing the use of its AP-190L array processor with IBM 360s and 370s.

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In fact, when you add up the savings in materials and labor, you'll find that printing with a Kodak Komstar laser printer is about 87% cheaper overall than printing with a paper-impact printer.

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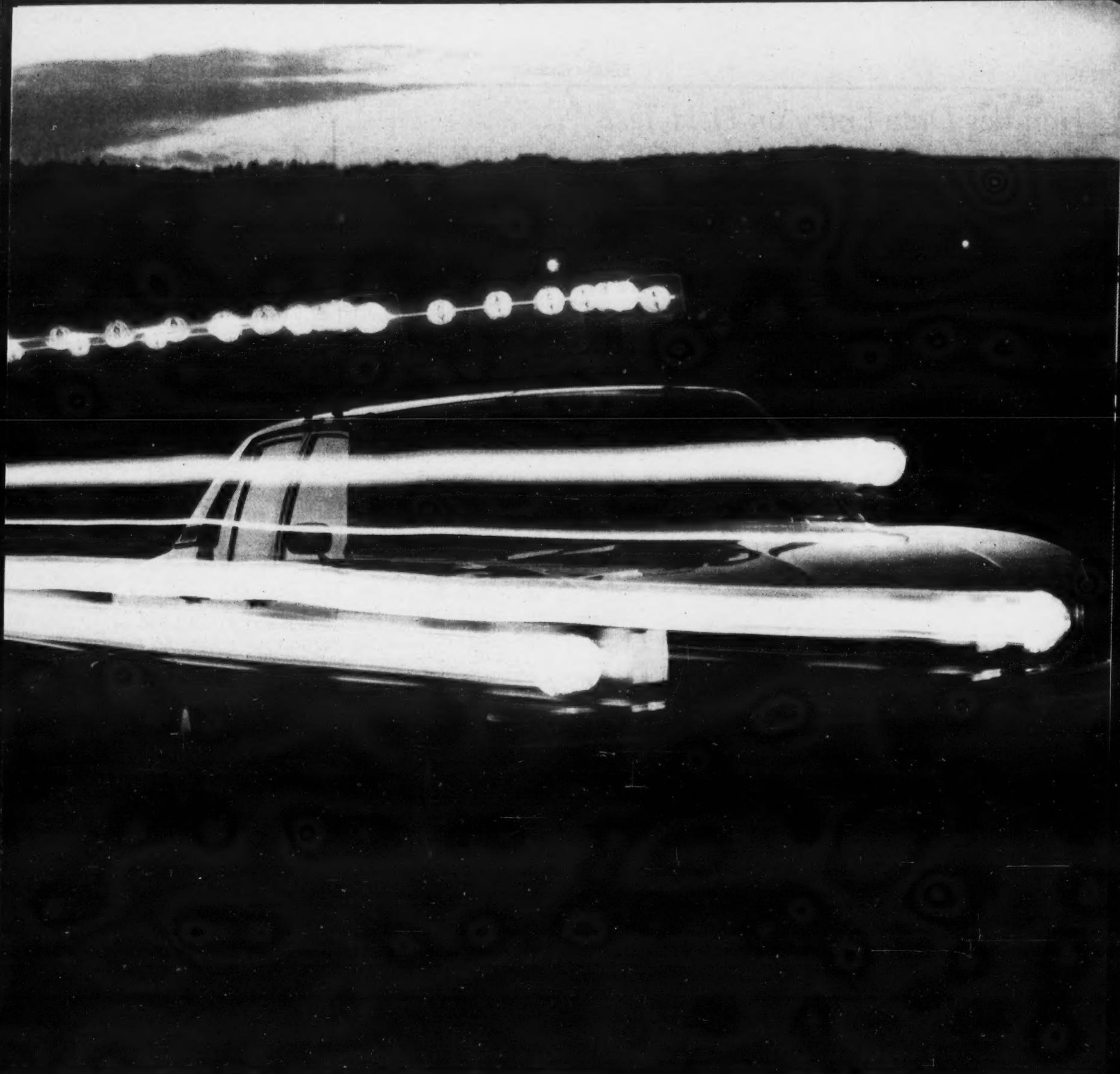
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Handles Data Entry on Field Test

Key-to-Disk Unit Goes on Army Maneuvers

FT. BRAGG, N.C. — Humidity from almost daily rain, unscheduled power shutdowns and near-freezing temperatures at night — not the ideal environment for computer equipment.

In March of this year, however, a key-to-disk system handled all the data entry requirements of a U.S. Army combat service support unit on an eight-day field test in the North Carolina woods and is continuing to help the unit save time and increase productivity at its base here at Ft. Bragg.

The Army's 18th Airborne Corps is a tactical combat force ready to support U.S. action any place in the world. One of its major subordinate commands, the 1st Corps Support Command (Coscom), uses an IBM 360/40 mainframe to provide all administrative and logistical information handling for a corps force that can exceed 100,000 personnel as well as for its helicopters, weapons systems, tanks and other equipment.

Prepared for providing tactical combat service support for a military operation of any

size, Coscom can assemble its mainframe on two specially equipped 45-ft tractor trailers for movement within two to four hours. The computer, once in the field, handles various processing tasks as it would at the garrison.

Data comes in from the combat divisions, for example, on the availability of troops for tactical decision-making or on inventory control to speed delivery of supplies to combat units.

Punched Card Problems

In the past, support units used keypunch equipment, which they also brought into the field for input to the mainframe. Under "combat" conditions, however, punched cards created their own particular problems.

"In a humid environment, the punched cards swell and cause jams in the reader," according to Lt. Col. Gerald Hicks, assistant chief of staff of management information systems for Coscom. "We also had trouble losing cards. In one cycle, we would use from three to five trays — or 9,000 to 15,000 cards — for input.

"Often, by the time the cards got from the keypunch truck to the mainframe, we would be missing a tray. Not only did this slow the cycle, but we were left with missing information."

In January of this year, Coscom's Material Management Center (MMC) replaced its four IBM 029 keypunches with an Inforex, Inc. Model 1303 key-to-disk system to handle its numerous transactions in overseeing the supply of clothing, repair parts and other commodities to the corps.

"We wanted to have state-of-the-art equipment and increase our productivity," Hicks remarked. "We checked out Inforex with people using its equipment, and they were pleased with it. The Army also has a requirements contract with Inforex, and we knew that would speed approval since we are the first tactical unit to use such a system."

According to Hicks, the transition from keypunch equipment to the key-to-disk system — with five workstations, processor, tape drive and card reader — went smoothly. "It's very easy to train the operators. We received the system in January, and our people were operating it within two to three days. We've experienced a 20% increase in our productivity rate; the error rate has decreased to almost zero."

Approximately 60% of the processed data coming into the MMC on keypunch worksheets is generated by

Coscom's commodities unit, which receives and maintains an authorized stock list of items for supply to the various divisions. This information is used to identify stock, keep track of inventory on hand — its condition and place of storage — and list inventory on order.

Prepunched cards in the form of requisitions, status requests, delivery notices and so on make up the other 40% of input. These come in from supply units which deal directly with the combat divisions and from national inventory control points, which supply the stock for the commodities unit.

The information is processed on the mainframe's Standard Army Intermediate Level Supply (Sails) system and used to direct the flow of materials for the corps as well as generate reports to senior staff and agencies of the Department of Defense for analysis and policy planning.

System on Maneuvers

While watching the delivery of the Inforex equipment, Hicks and his maintenance technician got the idea to use the system on maneuvers, as they had the keypunch equipment. "When we saw that the minicomputer was actually shipped via commercial carrier on casters and wrapped in a plastic bag, we wondered why we couldn't deploy and operate the system from a van as well as from the garrison.

"Chief Warrant Officer Ed Gidley, our computer technician who maintains the 360/40 and other electronic equipment, sat down and looked over the van and the system. Using whatever was on hand, including styrofoam, rubber matting, heavy nylon strapping and metal rings obtained from an airborne unit, Gidley worked out the details."

The system was strapped into the back of a standard M313 expandable van — a 2.5-ton truck whose body can expand by 4 ft on either side — and driven over 35 miles (approximately eight of which were unpaved) to the Camp McCall field location.

Usually, equipment like the key-to-disk system must be studied and tested by a battery of Army experts before it can be "authorized" for general Army use. However, since this process can take several months to several years, the Army has authorized use of off-the-shelf equipment to save time and take advantage of computer technology.

"We stay prepared to support any worldwide contingency," Hicks commented. "My feeling is that if we have the equipment that does the

job — and does it well — then that's what we want to take."

Readiness Training Test

The eight-day field exercise for the corps included an operations readiness training test for the MMC and the 14th DP Unit. The units are given the setting and logistics of an operation in a particular world location, then expected to perform their required tasks from that location as they would on a contingency mission.

"We tried to go out with a positive attitude," Hicks noted, "but we did have a fear of failure. We were making an effort to protect against any failures on our part, and we wanted to learn some lessons on what problems to expect in the future."

The key-to-disk system provided benefits in the field as well as at the garrison. "With the Inforex system we only handled one magnetic tape rather than trays of cards; it's faster and much easier to read into the computer," Hicks remarked.

"Operating conditions in the field were very poor," he commented. "The van was dusty, and the humidity was very high from almost daily rain. Temperatures ranged from the 70s during the day into the 40s at night. We used heaters and they put out some smoke — when they worked. When they didn't work, the equipment operated in near-freezing temperatures."

"Any of these conditions could have caused a system failure, yet the equipment continued to operate without any major problems. Overall, the test was a resounding success."

Coscom has ordered another Inforex 1303 for its personnel service center and eventually will get a distributed processing system for even greater availability of management information.

The Inforex system offers more than cost savings; it offers combat readiness. "With the sophisticated weapons systems in use, as well as helicopters, trucks and tanks, a failure or even a delay in getting supplies to a unit could mean a tremendous loss of combat effectiveness in a short amount of time," Hicks concluded.



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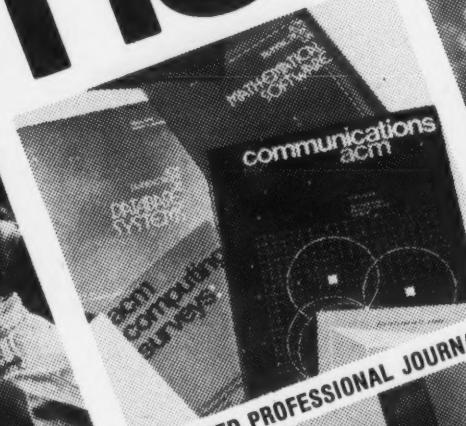
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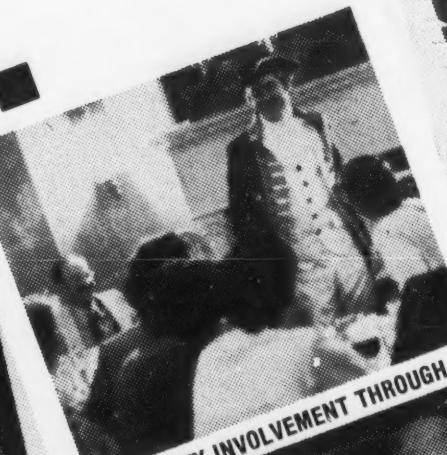
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Service Tracks Each Vehicle in Corporate Fleets

(Continued from Page 59)

200,000 vehicles. Data on each vehicle is current to within 24 hours.

Typically, an operator keeps a car in a fleet for about 28 months before selling it; trucks are usually kept longer. In order to meet tax and other reporting requirements, Gelco retains information about the vehicle on-line for a year after it leaves the road or is sold. After that, while not required to update the data about the vehicle, it keeps the information on microfiche for several more years.

"Once the basic decisions on quantity, manufacturer, models, destination and financing terms have been determined, computerized transaction processing takes over," Lever explained. Gelco's staff enters the customer order

using a CRT; some details relating to options are entered later, according to parameters predetermined by the customer.

Once the vehicle order for an entire fleet is recorded in the system, Gelco's system completes the order by adding preference information such as color, then relays the order directly to the manufacturer in Detroit.

"It's all computer-to-computer from this point," Lever said. "The system has been programmed to emulate a data entry device within the automobile manufacturing firm. Thus, when we ordered 4,300 automobiles from a single manufacturer over three evenings and fixed the delivery schedules with each factory closest to the final destination, our system communicated

with the manufacturer's computer with no problems."

Gelco also tracks each vehicle through the production cycle, monitoring its status until it is finally delivered to the dealer nearest the customer's employee who will operate the vehicle. Once a serial number has been established, Gelco starts the registration process with the state in which the car will be based, he said.

Data Base Integrity

Data security provisions have been established between Gelco and the auto companies. Gelco customers who have terminals of their own and who have appropriate data identifiers can dial into the Gelco computer to check the status of individual vehicles on or-

der. "This capability, however, is on a 'read-out only' basis," Lever noted.

"To change the specifications on an individual vehicle, the customer must notify Gelco," he added. "Thus the integrity of the data base is protected, assuring a minimal amount of interruption to the entire fleet order and preventing unauthorized tampering with sensitive information."

The entire operation from vehicle selection through order and delivery schedule determination is called the Direct Order Entry System (Does). The Does software was developed by Lever's 25-person programming department to take advantage of Honeywell communications (Network Processing Supervisor), data base (Integrated Data Store/II) and program development (Management Data Query System) executive software systems.

The Network Processing Supervisor coordinates network communications over 25 lines among Honeywell CRTs, teletypewriter units and a Honeywell Level 6 Model 43 located in Toronto. That minicomputer is used for document entry and fleet maintenance of vehicles in the Canadian market.

The company's 384K-word system includes eight tape units, 24 disk units containing 200M bytes of mass storage each and printers, readers and punches.

Does was implemented first in 1975, when Gelco installed its first Honeywell Level 66 system. In 1977, the order status retrieval system was introduced to give domestic customers up-to-date information on their vehicles.

Maintenance Management

Another service program, called Maintenance Management, encompasses regular service and emergency repairs. Using CRTs, mechanics make maintenance and repair decisions that take into consideration prices, quality, repair location, possible downtime and warranty coverage.

A combination of 14 Wats lines and nine local lines connect the maintenance administrators with fleet users throughout the U.S. on a 12-hour basis. Incoming call notices are directed to the administrator responsible for the appropriate geographic region, who then uses a CRT to retrieve the appropriate data before accepting the call.

"Using his mechanical background, information available from the calling driver and the vehicle's maintenance history, the administrator provides a preliminary diagnosis," Level explained. "A 50,000-firm vendor file is consulted for the reputable service facility nearest the driver, and an estimate is made of the cost of repair.

"Once the problem is diagnosed and the vehicle is in the proper repair facility, the administrator performs all negotiations necessary to issue a purchase order."

The maintenance administrator then generates a purchase order authorizing the work. The order contains an estimate and the name of the service facility.

"Without the computer, we'd never be able to provide these services for our corporate customers. Our capabilities and growth have been paced by the upgrades and improvements in computer services," Level said. "Otherwise, we'd be just another fleet leasing and management firm."

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Because in creating System/38,

Turn the page ►

IBM thought on a very big scale.

And System/38 can have a large impact in stepping up the efficiency and profitability of the organizations which use it.

Big computer functions in a small system

System/38 is designed to let any organization enjoy the productivity advantages of online applications typical of large-scale computers.

Specifically, IBM sought to incorporate in a simple-to-operate smaller system advanced functions that make work station applications easy to design, install and maintain.

Functions like an integrated online data base with data base management. Single level storage. Simplified computer-aided programming. Total system management through a central control facility. Real-time inquiry and update. Online training capability. Data integrity and security.

A tall order, you'll agree.

Especially for a system leasing for as little as \$2,800 a month.

Yet IBM System/38 has *all* the features listed above—and more. Not just some of them. Every one of them.

Together, they provide what may be the most attractive package of computing benefits ever offered to business.

What can System/38's functions mean to your organization?

Let's review them briefly.

Distributed online work stations

One of the biggest advantages of System/38 is that users don't have to come to the computer to get the vital information needed in their jobs. Instead, the computer comes to them where they work, by means of online display stations and printers called work stations.

As many as 40 local work stations—as well as additional remote work stations—can communicate with System/38 interactively. They can bring the power of the computer to people doing totally different jobs. At executive desks, in departments, plants and warehouses.



The New IBM System/38.

The System/38 configuration shown here costs \$3,978 a month on lease or \$135,190 purchased. It has 512K bytes of main storage, 193.5 megabytes of auxiliary storage, a 650-line-per-minute printer, seven display stations, a remote printer and all necessary system software. Other complete configurations of System/38 lease for as low as \$2,800 a month. Programming and equipment are available under separate agreements.

Across the hall or across the country. And the same up-to-date information will be available concurrently to all authorized users for real-time inquiry, change or update.

The value of System/38 in keeping everyone up to date can scarcely be overestimated. It can mean hundreds of thousands of dollars saved in operating efficiencies.

A self-managed system

There are two aspects to computing: processing the data itself and managing the system that processes the data. System management can consume a great deal of

expensive time and talent.

System/38, however, has a remarkable internal facility that eliminates much of the complexity of system management. Called the Control Program Facility, it monitors and manages system activity—including the flow and processing of data. As a result, users and programmers are free to concentrate on their own jobs, rather than worrying about how the computer performs its tasks.

Central online data base

Instead of having separate data files for each application—one for or-



Photo is of design models and display screens are simulated computer displays.

der entry, for example, and another for inventory - System/38 lets you combine data for related applications into a single online data base. The integral Data Base Data Management facility presents data in whatever format and sequence is required by the user.

Every user can be in touch with the same central source of information. When data is updated for one application - say order entry - it's available for all others using that information, such as production, shipping, accounts receivable and inventory. Duplicated and conflicting data can be eliminated. Infor-

mation is easier to retrieve, revise and use.

Streamlined programming

Both new and experienced programmers will find their work simplified and speeded with System/38. Thanks to advanced technology, many functions that ordinarily require programming have been absorbed by the system.

For example, System/38 offers a powerful "query" function which can break out data in the data base as required by the user and present it in the desired sequence and report format - without conventional pro-

gramming. Executives can use a work station at their desks to obtain special management reports in minutes, rather than days or weeks.

And with RPG III, an advanced version of the familiar RPG language, programmers are given new freedom to tailor processing of data and flow of logic to the needs of an application. Moreover, new application programs can be compiled, tested and "debugged" from any work station - in real time and using real data samples - while regular processing continues without being

More on System/38, turn the page ▶

affected. This means that a programmer is no longer burdened with manual coding, card punching and waiting for test time and results.

In short, System/38 can mean greater programmer productivity. Streamlined programming like this benefits both the programmer and the user who want results fast.

Single level storage

Another feature that makes for operating efficiency is an extension and simplification of the virtual storage used in larger computers. In System/38, IBM has taken this technique a big step further with the concept known as Single Level Storage Management.

It treats *all* storage – both main and auxiliary – as a single unit or level and automatically keeps track of everything stored in it. Users, particularly programmers, no longer need be concerned about program size or location or any other aspect of storage management.

Online training

As more employees become involved with the computer, training them in its operation becomes an important task. With System/38, your people can get "hands on" experience at live work stations, using actual data files – without fear of record destruction and without interfering with the use of the system by others.

And the prompting and guiding messages flashed on the screen can aid both trainees and regular users alike. There is even a "HELP" key for use whenever further assistance is needed.

Data integrity and security

System/38 provides an extensive range of security levels. They vary from simple basic precautions to an advanced plan which assigns a personal identification code to every user.

Under this plan, the information any individual can access,

Behind System/38: a technological breakthrough

At the heart of the major price/performance improvements of IBM System/38 are two pace-setting technological advances.

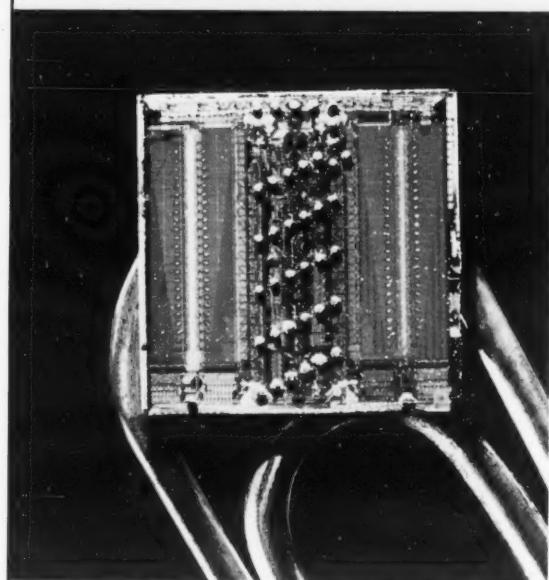
The system's memory uses a new silicon chip technology with up to 64,000 "bits" or elements of information per chip. A speck of silicon less than one-tenth of a square inch in size, the 64K chip is the most densely packed chip yet employed as a standard computer component.

And in the processing section itself, System/38 uses a logic chip with up to 704 circuits – more than 25 times the capacity of the processor logic chips employed in IBM System/3.

But that's only part of the story. A totally new architecture, incorporating advanced features new in themselves, was developed for System/38.

Through it, it became possible to shift some of the customary software of the computer operating system to internal handling by System/38 itself. In turn, the operating system took on functions that ordinarily call for programmers to write special instructions.

System/38 thereby relieves programmers of much tiresome and repetitive work. And the convenience of compiling, testing and "debugging" programs at work stations – interactively and in real time – can mean greater programmer productivity and faster computing results.



Shown about seven times actual size, a 64K chip is depicted on a paper clip.

change or process is carefully designated and restricted according to a user "profile" stored in the data base. In a multiple work station environment, with large numbers of users, this kind of positive individual control can be particularly helpful in assuring the integrity and security of computer data.

Conversion from System/3

Conversion to System/38 from an IBM System/3 can be aided with conversion utility programs. They allow the user to do as much as possible of the conversion process on his System/3 prior to installation of System/38. These programs are designed to make conversion easier, faster and less expensive and protect the user's investment in software.

Growth with IBM support

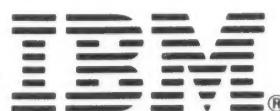
Once installed, System/38 is de-

signed to grow with your business. New capacity and components – such as added work stations or additional storage – can be attached quickly and easily, without recompiling existing programming to accommodate the new configuration. And most maintenance can be performed while the system continues to operate.

Moreover, wherever you're located – in midtown Manhattan or mid-Nevada – you know that IBM support is responsive. The IBM commitment to customer service goes far beyond simply supplying hardware. IBM stays with you.

With totally new architecture and dramatic advanced functions, System/38 can be an investment that will pay dividends for many years to come. To get the full story on System/38 and what it can do for you, call your nearby IBM General Systems Division office. Or write P.O. Box 2068, Atlanta, GA 30301.

A small computer can make a big difference.



Mini Bits

Interface, 64K Memory Replace Interdata Units

CRANBURY, N.J. — Users of the local memory bank interface system for Interdata's 7/32 minicomputer can reportedly replace that unit with a compatible memory bank interface system from Dataram Corp. Among its other features, the interface system operates with Dataram's recent 64K-byte core memory module that replaces its 64K-byte, single-board Interdata counterpart, according to a spokesman.

The interface system consists of a 14-in. rack-mountable chassis and an interface board that drives the chassis's memory modules. Like its Interdata counterpart, the system provides 16 slots for memory boards and assorted peripheral controllers.

Eight of these slots hold any of Interdata's current core memory modules or Dataram's 64K-byte DR-717 core memory boards. With all eight memory slots occupied by the DR-717 modules, the interface system stores a maximum of 512K bytes.

In addition to operating with the interface system and the 7/32 minicomputer, the Dataram 64K-byte core memory boards plug into the Interdata models 50, 70, 6/16, 7/16, 8/16, 8/16E and 8/32 minis, the source added. Available in 32K-byte as well as 64K-byte configurations, the memory modules cycle in 750 nsec and allow users to set parity through an on-board DIP switch.

The interface system costs \$4,800, compared with \$3,040 for the 64K-byte DR-717 and \$1,985 for the 32K-byte version. Dataram is located at Princeton-Hightstown Road, Cranbury, N.J. 08512.

Papers Sought for Mini Symposium

DALLAS — The Association for Computing Machinery has issued a call for papers to be presented at its Second Annual Symposium on Small Systems, which will take place Oct. 1-3, 1979, at the Hilton Inn here.

Authors who wish to present papers at the symposium, nicknamed Sigsmall '79, should submit their completed texts by April 1, 1979, according to conference officials. Topics to be covered at the symposium will include business and industrial applications for microprocessors, small system applications in entertainment and education, distributed processing with small systems and minicomputer and microcomputer software advances.

Prospective speakers should send abstracts to Dr. Fred Maryanski, Computer Science Department, Kansas State University, Manhattan, Kan. 66506.

Controller Links to Dual-Head Disks

SUNNYVALE, Calif. — Users of dual-head, double-density disk units can reportedly connect their equipment to Data General Corp., Digital Equipment Corp., Hewlett-Packard Co., Interdata, Varian and other vendors' minicomputer systems with a disk controller from Advanced Electronics Design (AED), Inc.

Besides supporting 1.2M bytes per diskette, the 6200LD provides a programmable format, MFM recording, eight interfaces, cycle redundancy check, initial program load and drivers for DEC PDP-11 and LSI-11 processors, according to an AED spokesman. In its 7-in. high cabinet, a standard 6200LD incorporates two disk drives to which users can add two additional drives.

Available with drives or in kit form, the controller costs \$2,000 in OEM quantities and can be ordered from AED at 440 Potrero Ave., Sunnyvale, Calif. 94086.

Systems Outdo Series/1, Sell for Half the Price

By Jeffry Beeler

CW Staff

CINCINNATI — Computer Systems Development, Inc. (CSD) has coupled 16-bit microprocessor technology with an integrated software system to produce a Series/1-like small business system family that reportedly delivers an average of 25% more processing power than its IBM equivalent for roughly half the price.

The introduction of the Sentinel series marks the first use of Intel Corp.'s 16-bit 8086 microprocessor chip in a commercial system, a CSD official claimed. He cited the 600-nsec device as one reason for the line's reported price and performance advantages over the Series/1.

CSD, formed earlier this year after

Cincinnati Milacron, Inc. shed its Electronics Systems Division, also credits the Sentinel family's competitive edge to its software system, which was developed for the Champion International, Inc. paper company by Cincinnati-based Tominy, Inc. Named Champion Distributed Processing System (CDPS) by its developer, the software integrates an operating system, a Cobol-like programming language tentatively known as Champtalk and utilities plus a "full-function," multitasking data base management system, according to the spokesman.

With CDPS, users can reportedly compile application programs on a Series/1 processor and then run them on a Sentinel series

(Continued on Page 82)



One of four members of CSD's Sentinel line, the Model 30 can provide either stand-alone DP capability or replace the IBM Series/1 in 370-based distributed processing networks.

Exec Urges Regular Checks Of DP Security Procedures

PISCATAWAY, N.J. — Because minicomputer fraud has become an accepted fact of life, DP security systems require periodic evaluation to ensure they continue to meet their users' needs, according to Systematics, Inc. marketing manager Robert Lawrence.

Security systems installed several years ago may have grown "totally inadequate because of changes resulting from expansion or in the configuration of the computer facility," warned Lawrence, whose firm makes an identification card system that controls access to DP sites.

"Usually revisions are made when some fault is detected, which may be too late. Periodic reevaluations of security personnel, systems and hardware are mandatory if the new sophistication in computer fraud is not to continue to take an unacceptable toll," Lawrence said in a recent interview here.

Although users can discourage computer crime with the right combination of hardware and software, that precaution alone constitutes only a partial remedy to a growing problem. To safeguard computerized data bases from theft or misuse, users must also carefully restrict employee access to computer facilities and the sensitive files they contain, he maintained.

Whether their hardware manages competitive business information, national defense

data, personnel files or financial and accounting data, users must rigorously screen each DP employee before authorizing that individual as a systems operator or manager.

Particular care should accompany the screening of high-level employees, Lawrence urged. Personnel knowledgeable and technically proficient enough to purloin printed or magnetically stored data are usually not found in the lower DP echelons but among top administrators, whose positions demand almost unrestricted access to a company's confidential data files.

Unfortunately, many users balk at the suggestion that they scrutinize prospective DP employees more closely, and this reluctance particularly applies to those high in the corporate computing hierarchy, he said.

Why the Reluctance?

Why do many users feel so uneasy about investigating a job applicant's background and evaluating his character? Part of the squeamishness stems from an unwillingness to admit that "personable and clubbable" professionals would commit on-the-job crime, Lawrence said.

The reluctance also stems in part from the psychological need to support members of "the team" and give them every benefit of

(Continued on Page 74)

ENTERTAINMENT

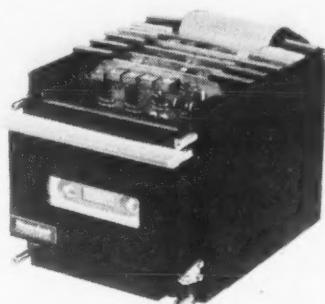
Cassette Recorder Debuts

NEWTON UPPER FALLS, Mass. — Using its read-after-write capability, a cassette recorder from Memodyne Corp. allows users to monitor data as it is written and thus ensure integrity, a spokesman said.

The Model 764-8EU also reportedly accommodates variable block lengths and provides an automatic reversal feature that permits users to record on both of the unit's recording tracks without reversing.

Compatible with American National Standards Institute and European Computer Manufacturers Association tapes, the recorder rewinds and searches at 100 in./sec, records and plays back at 800 char./sec and stores a maximum of 2.2M bits, equivalent to 1,600 data

blocks/track, the spokesman said. In OEM quantities, the recorder costs \$865 and is available from Memodyne at 385 Elliot St., Newton Upper Falls, Mass. 02164.



Memodyne 764-8EU Recorder



Looking back. And ahead.

All indications have it that 1978 will go down as another banner year for the computer industry. User spending for 1978 should at least match the IDC — projected \$42+ billion, up 15% from 1977. Budgets in almost every major category show increased growth over 1977, and 1979 is shaping up to be a repeat performance.

Our December 25/January 1 Combined Issue Special Report takes a look back at the year in computers, as well as a look ahead for 1979. The *Computerworld* editorial staff will take a break from the holiday season just long enough to give you some hindsight and foresight on topics like:

- The impact of inflation on computer use and configuration
- User-vendor relations
- Market trends — products projections for '79
- The year in court — IBM and Memorex

If you're concerned with the trends in the computer industry, you won't want to miss our Year-End Review and Forecast. And if you market products for the computer world, here is a good place to advertise. Color close is December 8; black and white close, December 15. Your *Computerworld* representative can give you all the details, and assistance in ad planning. Or, to reserve space, call Terry Williams at (617) 965-5800.



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Memory System's Capacity Three Times That of MJ11

IRVINE, Calif. — Although it occupies half the space of the Digital Equipment Corp. MJ11 core module, an MOS memory system from Plessey Peripheral Systems, Inc. reportedly provides three times the capacity of that DEC counterpart.

Intended for the DEC PDP-11/70 system, the PM-SJ11 comes in two standard versions: a 256K-byte model expandable to 1.5M bytes and a 128K-byte model expandable to 768K bytes, according to a Plessey source.

Other features include error correction code, which spots and rectifies memory errors before they go to the CPU, and an error logging register (ELR), which records errors that arise

during memory access.

With the ELR feature, the PM-SJ11 provides the address and bit locations for single-bit errors and address information for double- and multiple-bit errors, the spokesman continued. The system then displays these errors on its control panel, which uses colored indicator lamps to distinguish between single- and multiple-bit errors.

The memory system's main modules include one to six memory boards and two controller boards, which provide parity control, error correction, memory timing and error logging circuitry, plus an electrical interface for the PDP-11/70 main memory bus.

These modules as well as an integral power supply, cooling mechanism and front panel fit into a 5.25- by 19-in. chassis that mounts in the CPU's memory bay, the spokesman explained.

A fully equipped 256K-byte version of the PM-SJ11 system costs \$10,055 from Plessey at 17466 Daimler Ave., Irvine, Calif. 92714.

Exec Advises Regular Checks

(Continued from Page 73)

the doubt. A third factor is the fear that overly rigorous screening methods might send job candidates running to the competition.

Finally, users fear poor community relations — the company gets the reputation of being paranoid on the question of security, he added.

The syndrome that brings insufficiently examined professionals onto the scene is easy to describe, Lawrence said. A candidate approaches a prospective employer highly recommended by a friend or acquaintance of a manager.

References are checked cursorily, and if one or two cannot be located, they are not pursued. As a result the employee gains authorized access to critical information without undergoing adequate screening, he explained.

To rectify this potential problem, users need not institute special "star chamber" procedures, but instead, establish a firm management policy for all job candidates at management, professional and security levels, he recommended. This program should be spelled out in printed form proclaimed to every job applicant.

It should state that all references will be thoroughly checked and any discrepancy, however seemingly trivial, will need to be satisfactorily explained.

All candidates in these categories should be subject to professionally structured lie detector tests, and failure to comply with this requisite should effectively bar the candidate from further consideration, Lawrence asserted.

These precautions become onerous only when they are selectively applied and thus appear directed at particular individuals. When they are universally applied, no one can justifiably charge discrimination, and security is certainly enhanced, he said.

Although Lawrence conceded his suggestions might sound drastic, he justified them as necessary for national security and corporate survival.

"I can give you ten reasons why our OMEGA 480 is the better business decision."



*Donald E. Roepke, Group Vice President
Peripheral Systems, Control Data Corporation*

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And an OMEGA 480 system requires about one quarter the *power* and one half the floor space of the comparable 370.

Of course we designed it to be *field-upgradable*. That means you can start with the smaller OMEGA 480-1 now, and upgrade to the larger processor when your needs require the higher performance.

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REGINA, Sask. — The cost of maintaining a telephone service order system at Saskatchewan Telecommunications, Inc. has shrunk by more than \$16,000/mo since the firm implemented a distributed system that links corporate headquarters to key departments in eight of this Canadian province's cities.

Designed to provide overnight processing of changing customer data, the telephone service order network incorporates a central 192K-byte Digital Equipment Corp. PDP-11/70 minicomputer linked in a star configuration to eight 124K- or 96K-byte PDP-11/34s, one here and one in each of seven district offices.

In addition to linking the remote computing sites with Sask Tel's marketing and customer billing divisions here, the Information Gathering, Retrieval, Editing and Distribution (Ingrid) system transmits data between 92 terminals in the district offices' commercial, plant assignment, plant dispatch, warehouse, traffic and directory services departments.

Before it installed the Ingrid system early this year, the company wrote service orders for this city and Saskatoon by hand, punched the order data onto paper tape and then verified and transmitted the orders to headquarters through a 300 bit/sec teletypewriter network. Sask Tel's systems and programming supervisor Bob Hockings recalled.

The company forwarded service orders from smaller districts by mail. At the main office, clerks punched paper tapes, which they then converted to magnetic tape for batch processing on an IBM 360/50.

Turnaround Too Long

Under this earlier system, however, the phone company had to endure unacceptable turnaround times and experienced significant encoding or transmission errors, Hockings explained. Printing orders and mailing them to the appropriate departments typically took three to four days.

Even longer delays occurred during the winter months when storms hindered mail delivery.

Realizing that their previous system no longer suited a firm where service orders totaled 240,000 a year and volume grew 10% annually, Sask Tel officials decided to search for an alternative.

In traditional service order systems, phone companies either link remote terminals to a central mainframe, or rely on service bureaus. After considering both alternatives, Hockings con-

cluded that "implementing such systems was beyond the rational economic resources of the company. It was apparent that all companies with these systems had a larger subscriber base than Sask Tel, in a much more densely populated geographical area."

As a result, the company opted instead for a distributed minicomputer network with remote processors and terminals linked to a headquarters minicomputer. Such an alternative would cut operating costs and provide remote computing capabilities, Sask Tel officials reasoned.

Moreover, if any part of the distributed network malfunctioned, the rest would remain unaffected.

After investigating several prospective minicomputer-based networks, the phone company finally chose a Digital Network (Decnet) system from DEC. That hardware was chosen over rival systems primarily because DEC's "broad minicomputer line offered a selection of equipment to suit both large and small districts," Hockings explained.

Moreover, "the Decnet software provides the communications capability to support our internally developed applications programs."

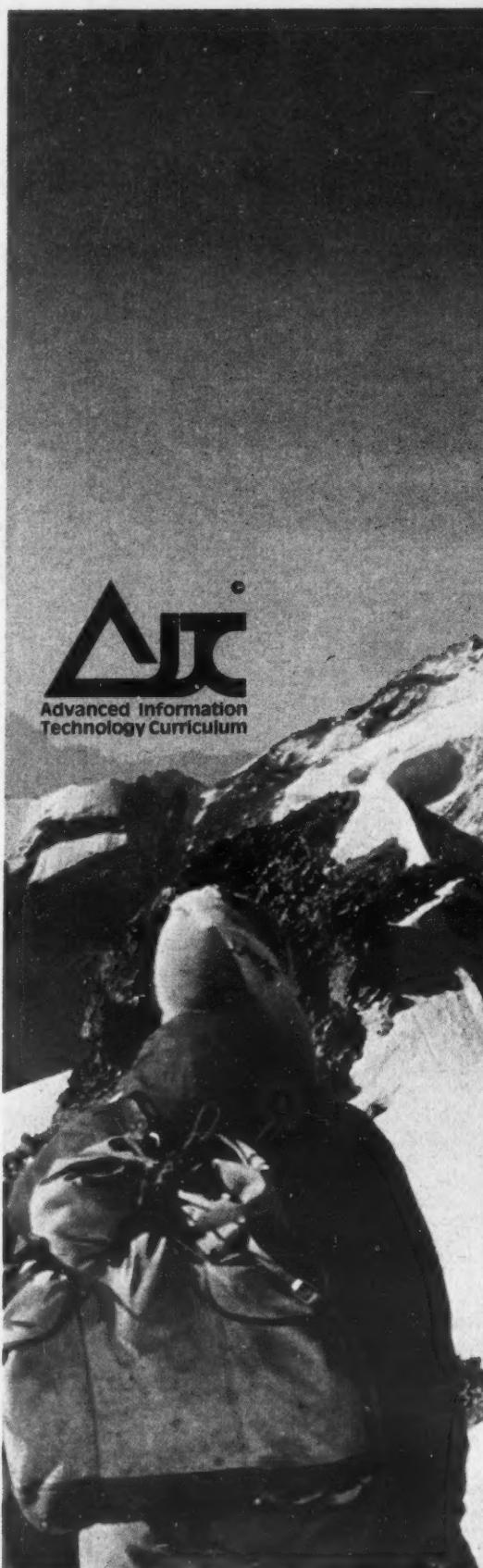
At corporate headquarters, the central PDP-11/70 supports two 88M-byte DEC RP04 disk units, two DEC LA180 printers, two 800 bit/sec TE16

tape units, one LA36 Decwriter II and one Vucom 3 CRT terminal.

At the Saskatoon office, a 124K-byte PDP-11/34 supports three 5M-byte RL1 disk units and 13 CRT terminals plus 12 printers and printing terminals.

Each of the remaining PDP-11/34s at the smaller Yorktown, Prince Albert, Swift Current, North Battleford, Moose Jaw and Weyburn district offices incorporates a 96K-byte main memory and supports two 2.5M-byte RK05 disk units, three LA36 printer terminals and four Vucom 3 CRTs.

Each remote system uses a Decnet protocol to communicate at 4,800 bit/sec with the central minicomputer.



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Retailer Adds System, Eliminates Record Loss

BOSTON — Besides improving its financial and merchandise control, a large local department store has eliminated misfiled and lost purchase orders, receipts and sales checks by switching from manual recordkeeping to an on-line minicomputer system.

Allied Stores Corp. earns \$1.9 billion per year by supplying merchandise to 175 department stores in 27 states. Each of those stores offers products ranging from apparel and cosmetics to housewares and furniture.

One of its department store clients is Jordan Marsh Co., a well-known New England retailer for many years. Jordan Marsh shipments arrive at its one million sq-ft warehouse in North Quincy, Mass., for delivery to 16 stores and thousands of customers

throughout Massachusetts, Rhode Island, Maine, Connecticut and New Hampshire.

One of Jordan's most challenging management problems arises in the home furnishings area, notably in furniture and major appliances. This area requires broad support in purchase order management, customer service, inventory control and timely management information.

Big Ticket System

The equipment that provides this support is known as the big ticket system. The real challenge with any big ticket system lies in satisfying the often conflicting requirements of salespeople, customers and warehouse and delivery personnel.

To provide Jordan Marsh with such comprehensive support, Allied looked to computerization to replace its manual DP system. Before June 1977, Jordan Marsh maintained a customer history file by retaining all its sales checks, according to Steve Nezer, Allied's project manager for DP systems.

"When a customer telephoned with an inquiry, someone would have to search through the files for a copy of the sales check," Nezer recalled. "It was a long process that did not allow us to respond immediately to a query."

With 60 to 70 daily calls that ranged from reserving a piece of merchandise to complaining about a product defect, the manual system proved untenable.

"With so many transactions, misfil-

ing was not uncommon and records could be lost forever," Nezer said.

In addition, the volume of paperwork and filing continually increased, Nezer explained, because of Jordan's policy of maintaining active and inactive sales check files for several years. "Stock locator cards were also held on file so we could respond to questions concerning missing merchandise for up to six months after a sale," he noted. Beyond that time, the sales check was the only record.

Wanted It All

"We wanted a cost-effective system that could satisfy all our complex needs, yet be simple to program and operate," Bill Stapleton, Allied's DP director, explained.

By closely watching developments in the minicomputer market, Allied became aware of Wang Laboratories, Inc.'s intention to introduce its VS system last year. The VS system seemed to satisfy all of Allied's "wish list" requirements, and a prototype was installed at Jordan's North Quincy warehouse in June 1977.

"It became operational within a week," Stapleton said. In addition to a 2200 VS processor, the system includes two 600 line/min Model 2263 printers, one 120 char./sec Model 2231 matrix printer and 21 interactive workstation terminals.

Approximately 50 purchase orders per day are generated by Jordan's big ticket buyers. An original goes to the vendor, and a copy goes to the Central Control Unit (CCU) in the distribution center.

Purchase order information at the CCU is then keyed into the system at one of the VS workstations and stored for future use. As new merchandise is received at the warehouse dock, the receiver sends a packing slip by pneumatic tube to the CCU.

"The VS prints a copy of the purchase order for checking to ensure that all quantities and styles in the original purchase order match the merchandise received," Nezer explained. The information is then automatically updated in the system's data base.

After merchandise has been checked in, data about problems and damages is input into the system for a permanent record. The Model 2263 then prints four-section tear-apart merchandise tags listing ID number, description and warehouse or store destination information for each item.

All merchandise status information, which indicates whether an item is on hand or on order, is immediately accessible to any of Jordan's home furnishings salespeople at any of its stores.

It takes special skills to implement effective data communications systems, networks, distributed processing and database management.

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Performance Through Training

ATTC professional team profiles: one of a series



Chris Gane and Trish Sarson have built a strong reputation on both sides of the Atlantic in the application and implementation of structured techniques. As Co-Principals of Im- proved System Technologies Inc. (IST), they are consultants in both the development and training phases of the analysis and design of structured systems.

Before forming IST, Gane was Vice President for Development for Yourdon Inc. Sarson was Assistant Vice President in Computer Planning and Research at Manufacturers Hanover Trust Company. She graduated with an honors degree in science from London University. He holds a master's degree in physics and psychology from the University of Cambridge, England. Both began their data processing careers in London with IBM.

Before settling in New York City in 1973, Gane wrote two books in his native England: *Managing the Training Function*, and with Alan Unwin, *Digital Computer Logic*.

They are co-authors of two books: *Structured Systems Analysis: Tools and Techniques*, and with Ed Yourdon, *Learning to Program in Structured COBOL*.

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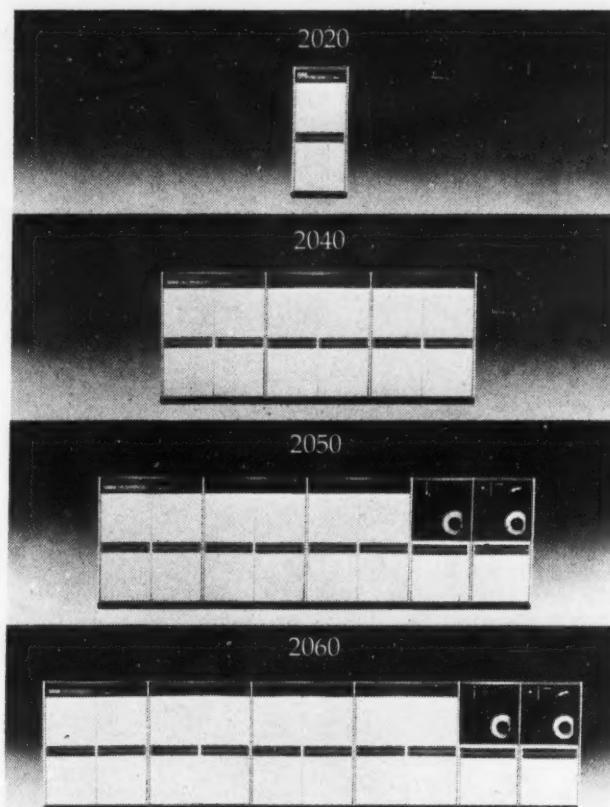
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Micros Tighten Car Dealer's Business Control

AUGUSTA, Ga. — Rather than having to endure processing delays as long as one day, a user here can obtain key information about its business activities almost immediately and correct errors just as quickly, thanks to two in-house microcomputer systems the company installed recently.

Spokesmen for Bob Richards Chevrolet, one of this state's largest automobile dealerships, credited the dual micro systems with tightening management's control over its business operations. Unlike most mainframes and some minis, which are physically separated from their users, Richards' systems literally operate alongside the clerks, mechanics and accountants who rely on them.

Built around two 64K-byte Pertec

Computer Corp. Mits microcomputers, the systems perform general accounting functions, maintain sales records and control and the spare parts inventory for the auto dealership's service department.

Looking for Control

Before Richards acquired the current systems, its only involvement with computers was through accounting service bureaus that managed the company's billings.

"But with sales exceeding 2,000 cars and trucks a year and a parts inventory in excess of 10,000 part types, some sort of system to bring things under tighter control was needed," dealership owner Bob Richards recalled. "The problem was that almost

every system we looked at — mostly minicomputer-based or time-shared mainframes — seemed to remove more and more control from the dealership."

For a year and a half, Richards searched for his firm's first in-house DP system, only to discover to his frustration that the more expensive the hardware, the less control he felt he would have over it, particularly its costs.

To increase Richards' frustration, most of the minicomputer systems he considered threatened to swell his costs rather than reduce them. For the jobs he wanted done, a minicomputer would have cost at least \$20,000 and the software another \$20,000 to \$30,000, with additional hardware and software maintenance costs of about

\$400 to \$500 a month.

"Once we committed ourselves to a system like that, we would have been wedded for life," Richards observed.

Two Different Micros

But with the help of the Computer Systemcenter of Atlanta and consultant Dale Wingo of Aiken, S.C. -based Sandlapper Systems, Inc., he finally found and subsequently bought the two Mits microcomputers, one of which is dedicated to bookkeeping and accounting and the other to parts inventory control.

"I expected to spend \$40,000 for a single system," Richards explained. "Instead, I got two systems for a little more than half that cost, and they do the job of some systems costing \$80,000 to \$90,000."

In addition to the two processors, the system incorporates three Hazeltine Corp. 1500 CRT terminals, two 10M-byte hard disk units and a 120 char./sec Decwriter III printer that is shared between the two applications. The system also uses a Basic language system called Disk Extended Basic.

Richards and his consultant opted to do all the programming themselves rather than buy ready-made programs. "Compared with some of the standard software packages offered by some minicomputer firms, the Mits software was incredibly inexpensive," Richards recalled. "We felt the applications were unique enough that it would be to our advantage to write programs tailored to our specific needs."

Accounting Subsystem

The accounting subsystem, in addition to the standard functions such as general ledger, accounts payable, accounts receivable and payroll, performs jobs unique to the auto sales business. Some of these jobs include maintaining vehicle inventories, producing repair orders and keeping daily, weekly, monthly and yearly sales records broken down by salesman and auto number.

The system is programmed "to keep track of each customer after he has bought a car, and it notifies the dealership on the birthday of the customer, the anniversary of the sale and when servicing is necessary," the consultant explained. "It even prints out the cards that can be sent to the customer."

In operation, the subsystem's disk storage unit is initially loaded with the data about member accounts. At the end of each day, all transaction data is entered to update the disk file.

To provide the dealership's management with a day-to-day reading of business activities, the system automatically prints a daily operation control report. The accounting subsystem hardware consists of a CPU, memory, disk unit and shared printer, whereas the parts inventory subsystem incorporates two CRT terminals in addition to the other units.

"One CRT is located on the customer counter for the clerk and one in the repair area for the mechanics," Wingo said. "Each time a mechanic uses a part in an auto being serviced or a clerk sells a part, each is required to fill out a simple form that appears on the CRT terminal. The system then updates the inventory list, checks inventory and lets management know when it is time to order new parts."

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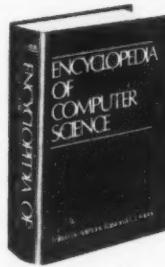


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Memory Subsystem Bows

READING, Mass. — Two processors can independently access up to 1M byte of common virtual memory with a multiprocessing memory subsystem from Datacube SMK, Inc., the vendor said.

Compatible with its National Semiconductor Corp. counterpart, the random-access RM-117 subsystem provides a 20 bit-wide internal memory address that is generated either through virtual memory or through its dual Intel Corp. Multibus interfaces.

The dual-port memory subsystem reportedly contains on-board control logic, and it provides control and memory mapping functions through I/O output commands to eight contiguous addresses. With access contention transparent to the user, the subsystem cycles in 350 nsec for one port and in 750 nsec if users simultaneously access both ports.

The RM-117 costs \$1,200 each and \$995 in quantities of 10. Datacube is at 670 Main St., Reading, Mass. 01867.

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Series of ac Power Conditioners Protect Gear From Line Surges

PLAINVIEW, N.J. — Users can reportedly protect their minicomputers, microcomputers, point-of-sale terminals, word processing equipment and other sensitive electronic units from more than 99% of a power line's surges, spikes and high-energy transients with a series of ac power conditioners from Pilgrim Electric Co.

The three Voltector Series 5 conditioners include the Model 7872, at 1A and 120 Vac; the Model 7873, rated at

2A and 240 Vac; and the Model 7874, rated at 3A and 360 Vac, according to a Pilgrim Electric source.

By limiting 2,500V spikes to safe levels, the three units allow users to run their computer hardware with primary power lines and thus eliminate the trouble and expense of installing dedicated lines.

All three models accommodate 60 joules of transient energy and are said to provide both common and transverse model protection against

pulsed, continuous and intermittent power line noise.

With an insertion loss of 70 dB above .5 MHz, the internally fused conditioners are packaged for office use and come with an on/off switch and pilot light.

The models 7872, 7873 and 7874 cost \$142, \$147 and \$156, respectively, and are available with a five-year warranty from Pilgrim Electric at 29 Cain Drive, Plainview, N.J. 11803.

Systems Outperform Series/1

(Continued from Page 73)
corporates a CRT terminal controller that accommodates up to four CRT displays. With multiple interface boards, the systems typically include 16 terminals, he added.

A standard Model 10 system serves primarily as an intelligent data entry station and incorporates a minimum of 32K bytes of main memory with a 1,920-char. CRT terminal and two dual-density 800K-char. floppy disk units or optional 1.6M-byte floppy systems.

The standard Model 20, by contrast, mainly suits stand-alone DP and provides at least 64K bytes of addressable memory plus a choice of 150-to-180 char./sec printers. Otherwise, the Model 20 includes the same hardware modules as the bottom-of-the-line system.

The Sentinel family systems come in four versions: the Models 10, 20, 30 and 40, which differ primarily in the peripherals and peripheral controllers they incorporate.

All four models incorporate the same CPU and, because of their microprocessor technology, accommodate up to 1M byte of main memory. In addition to an 8086 microprocessor, the Sentinel's CPU incorporates an Intel 8085-based controller that permits the CSD small business systems line to interface up to eight of Shugart Associates' latest disk units, including four of the company's 800K-char. floppy disk systems and an equal number of its 14.5M- or 29M-byte Winchester hard disk units.

A standard Sentinel desk enclosure provides enough space to accommodate up to four 800K-char. floppy disk units and up to two 29M-byte Winchester disk units for a total capacity of more than 60M bytes. With additional cabinetry, the business systems family can support more than 120M bytes of mass storage per control board. Moreover, the CSD series can accommodate several of these controllers simultaneously, the spokesman said.

In a basic configuration, each of the four Sentinel models in-

corporates a CRT terminal controller that accommodates up to four CRT displays. With multiple interface boards, the systems typically include 16 terminals, he added.

A standard Model 10 system serves primarily as an intelligent data entry station and incorporates a minimum of 32K bytes of main memory with a 1,920-char. CRT terminal and two dual-density 800K-char. floppy disk units or optional 1.6M-byte floppy systems.

The standard Model 20, by contrast, mainly suits stand-alone DP and provides at least 64K bytes of addressable memory plus a choice of 150-to-180 char./sec printers. Otherwise, the Model 20 includes the same hardware modules as the bottom-of-the-line system.

Like the Model 20, the Model 30 requires at least a 64K-byte central memory. But unlike its floppy disk-based sister system, the Model 30 incorporates a 14.5M-byte Winchester hard disk unit as standard equipment as well as a 300 line/min printer. A standard Model 40, meanwhile, provides 29M-byte Winchester disk systems plus a 300 line/min printer and a 64K-byte minimum main memory.

Users can upgrade their systems within the Sentinel line by merely plugging the appropriate memory and controller boards into their CPU chassis, the official explained.

The four CSD models will typically perform standard financial accounting functions for businesses whose annual revenues total \$100 million or less, he noted.

Among its communications features, the Sentinel family offers two controllers that permit asynchronous and synchronous transmissions at up to 9,600 bit/sec. The synchronous control board incorporates a microprocessor that reportedly accommodates IBM 2770, 2780 and Hasp remote job entry workstation communications.

Application programs now available with the CSD small

systems line include four horizontal software packages for accounts receivable, accounts payable, general ledger and payroll. In addition, the vendor is said to be currently developing two packages for the construction industry and certified public accountants.

Basic Model 10, 20, 30 and 40 configurations cost \$9,950, \$19,900, \$24,900 and \$34,900, respectively, with leasing arrangements available. First shipments of all four Sentinel versions begin in January from CSD at 4154 Crossgate Drive, Cincinnati, Ohio 45236.

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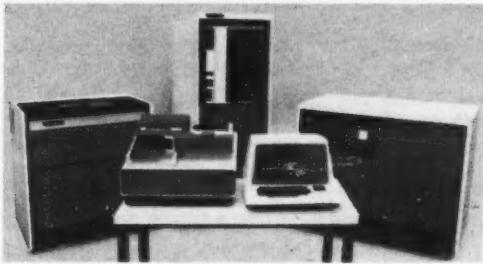
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HARRIS 1620 remote batch terminal.

tiprogramming capability. One large Harris 1600 can support up to four communications jobs concurrent with other tasks such as media conversion. The 1600 already supports virtually every communications protocol in wide commercial use today and will soon support full SNA capability. Communications interfaces are available up to 56 Kbps.



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Distributed Data Processing (DDP) Systems.

Harris DDP systems combine the proven performance of both our batch



New HARRIS 1670 distributed processing system.

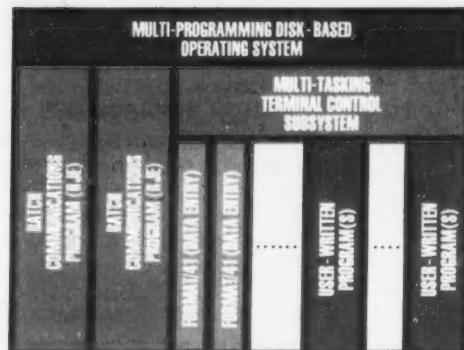
and interactive products into a single multi-function terminal. As a result, Harris systems can provide all five basic DDP functions *concurrently*: local or remote batch; data entry; local interaction and remote interaction. All of these functions operate under the control of sophisticated software providing flexibility normally found only on larger mainframes.



Software.

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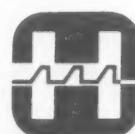
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- 22 Data processing/Systems manager
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- 32 Mfg., production, QC/QA, support
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- 34 Field serv. & support

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- 42 Sales mgr.
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Cuts Station's Overhead

Micro System Handles Radio Scheduling

By Ann Dooley

CW Staff

ANAHEIM, Calif. — Listeners of radio station KEZY here have a microcomputer-based system to thank for the smooth scheduling of that station's music, com-

mercials and disk jockey chatter.

An AM/FM rock station on the air 24 hours a day, KEZY has used a mini-based automated system for the last seven years to cut down on overhead. It also eases the deejays' workload,

leaving them free for promotion and production tasks, according to Mark Moseri, operations manager.

The station moved to a microprocessor-based system two months ago to get more flexibility in switching as well as more reliability, he explained. The new Basic A system is made up of three Intel Corp. 8085 microprocessors and was put together by IGM, a division of Northwestern Technology, Inc.

KEZY uses the system to handle all its switching, music selection and switching decision-making. The system can schedule the sound recordings played over the air for up to 4,000 audio events including songs, commercials and announcements. It also controls up to 16 audio devices such as time and temperature announcers, open-reel tape decks and cartridge tape players.

Little 'Live' Programming

The KEZY audience of 24,000 to 35,000 can listen to musical selections from cartridge tapes, station IDs, time announcements and disk jockeys without actually hearing a live voice for most of the programming period. The system can run for hours without human intervention, Moseri said, adding that the station does go live two or three times each 24-hour day.

The Basic A is programmed sequentially and keys the deejay patter, commercials and music over the air according to a schedule, he said.

The system can display the events coming up next to be broadcast on a color or black-and-white CRT. From a keyboard, the operator can add or change scheduled events or display any event or group of events that is needed. The scheduling is originally done on a weekly basis but programming changes occur almost daily.

The Basic A uses broadcaster's English instead of numbers, which makes things easier, according to Moseri. In order to notify the operator of an available time slot, for example, the system displays "Avail" on the CRT. The CRT can be color-

coded for further ease of use, he said.

The Basic A's three 8085s communicate with each other via RS-232 interfaces.

One micro acts as a system controller and the broadcast schedule is stored in this processor's Random-access memory (RAM). The processor keeps track of clock time, sends commands to the other two processors and communicates with the operator.

The second microprocessor, called a monitor controller, lets the operator preview recordings before they are selected or listen to what is currently being played. The third 8085 acts as a device controller for the audio playback equipment.

KEZY originally chose an IGM system because the company was one of the first in the field and was known for its reliability, Moseri said. The Basic A is especially reliable because the system functions are shared among the three processors, an important feature in a real-time controller, he noted. The monitor controller was also designed to act as a back-up system controller if the regular one fails.

Although mishaps still occur from time to time on the air, most of the problems result from disk jockey error or programming error, he said.

The microprocessors run Assembler language programs under RMS-80, Intel's real-time software support system. Since the RMS-80 is modular, Itel supplied only the functions that were needed, so the system is customized, Moseri said. For the Basic A, the RMS-80 modules were used for task switching, real-time clock, serial I/O control and system resource allocation. Eight tasks run under the RMS-80 on the main processor and other tasks run independently on the monitor controller and audio controller.

At this point, the station could not operate under anything but an automated system of this kind, he said. In addition to the cost savings, it makes things easier for the disk jockeys.

Micro Chips

AJA Software Offering Library Of Applications for TRS-80s

ORANGE, Calif. — AJA Software, developers of "ready-to-run" software programs for microcomputer applications, is now offering a library of application programs written specifically for the Radio Shack TRS-80 microcomputer.

Each program comes on diskette, is ready to run and has complete documentation, the firm said. Minimum system configuration includes TRS-80 Basic, one or more floppy disk drives and 8K of memory with an optional printer.

Selectric Conversion System Gains Interface

PLEASANT HILL, Calif. — Escon Products, Inc. has introduced an interface unit for its IBM Selectric typewriter conversion system that can interface to any microcomputer with an S-100 bus, parallel port, RS-232 or IEEE 488 unit.

A microprocessor is included on the circuit board for data flow control, formatting and character

Artec Adds 10-Slot Version of Motherboard

SAN CARLOS, Calif. — Artec Electronics, Inc. has introduced a 10-slot version of its 16-slot, silent, totally shielded motherboard. Intended for use in compact systems with large memories, the 10-slot configuration allows the processor and peripherals to be condensed into a smaller package, without large amounts of spurious noise in the bus lines, the firm said.

The board features a special Artec technique that terminates

Included in the offering are programs for letter writing, accounts payable and receivable, payroll, general ledger, inventory, sales and sales analysis, a medical/professional billing package and TRS-80 Basic and Disk Basic Tutorial programs.

Each package is guaranteed to be "bug-free" and AJA will correct any problem that develops, it said.

The packages cost \$35 each from AJA Software, P.O. Box 2528, Orange, Calif. 92669.

set selection. Installation on the Selectric is simple and does not affect normal typewriter operation, the firm said.

The S-100 bus interface costs \$496 complete. The parallel port is \$525, the RS-232 \$549 and the IEEE interface \$560 from Escon Products, Inc., Suite 204, 171 Mayhew Way, Pleasant Hill, Calif. 94596.

each S-100 bus line in an optimum impedance without increasing the zero-state leading of the bus drivers. This eliminates "ringing" but does not decrease capacity, the company said.

The shorter design means users do not waste money or space on unused motherboard capacity, the firm noted. The 10-slot board costs \$115 assembled and tested from Artec Electronics, Inc., 605 Old Country Road, San Carlos, Calif. 94070.

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NEC Unit Uses 8080A

WELLESLEY, Mass. — A single-board computer that uses the industry-standard 8080A microprocessor has been introduced by NEC Microcomputers, Inc.

The TK-80A combines NEC's own UPD8080AF MPU with 1K byte of random-access memory (RAM) and 1K byte of electrically erasable programmable read-only memory (EEPROM). It can be expanded to 4K by 8K bytes of RAM and 8K by 8K EEPROM, according to a spokesman.

The unit includes a Kansas City-type 300- or 1,200 bit/sec cassette interface and three 8-bit programmable I/O ports. The TK-80A costs \$299 from NEC Microcomputers at 173 Worcester St., Wellesley, Mass. 02181.

Intel Adds 16-Bit Single Board

SANTA CLARA, Calif. — Intel Corp. has introduced the latest Multibus-compatible member of its single-board computer line, the ISBC 86/12.

Based on the 16-bit 8086 microprocessor, the board supports a 1M-byte address space. It enables, for the first time, both 8- and 16-bit single-board computers to be interfaced over the same bus in multiprocessing configurations as well as with other pe-

ripherals, the firm claimed.

In this way, a designer can create a low-cost design using an 8-bit single-board computer and enhance it over time, a spokesman noted.

The ISBC 86/12 is supported by the Intellec Series II development system and software that supports high-level language development, he added.

Interfacing Software

In addition to the 86/12, Intel has introduced the ISBC

957 interface and execution package that reportedly permits software modules developed on an Intellec development system to be downloaded into the 86/12 for full-speed execution and debug.

This enables the designer to begin system development immediately with the 86/12 using the same software as for the ISBC 80 products, the firm said.

To facilitate program development, the interface and execution package provides all the hardware, software cables and documentation required to interface the Intellec system to the 86/12 board.

The ISBC 86/12 includes the 16-bit HMOS 8086 microprocessor; 32K bytes of dual-port dynamic read/write memory with on-board refresh and sockets for up to 16K of read-only memory (ROM); interfaces for both serial and parallel I/O; and a full RS-232C interface. It provides nine levels of vectored priority interrupts expandable to 65 levels over the Multibus system.

The ISBC 86/12 costs \$2,140 and the ISBC 957 package costs \$2,145 from Intel Corp., 3065 Bowers Ave., Santa Clara, Calif. 95051.

'Taxpro' Works On IRS Forms

ROWLAND HEIGHTS, Calif. — Dicomp Business Programming is offering software for the professional tax preparer who has an 8080 microcomputer, North Star Computers, Inc. disk drive and printer.

The Taxpro package processes Internal Revenue Service (IRS) 1040 forms and 13 related schedules with the "least tax" approach, according to the firm. It prints in format on 1040 forms and prints other forms on plain paper.

A similar package for the home user is Taxpac, which processes IRS 1040 and up to five related schedules and forms. The display is on a CRT screen with dollar amounts listed in order by form number.

Taxpro costs \$1,415 and Taxpac costs \$39.95 from Dicomp Business Programming, P.O. Box 8272, Rowland Heights, Calif. 91748.

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With Stock Market Jumpy Some Firms Postpone Stock Offerings

By Marcia Blumenthal
CW Staff

A jittery stock market and the uncertain economic outlook for the next year have resulted in some postponements of public equity offerings by companies whose offerings would have been effective by the end of the year.

While some firms have squelched their plans for public issues, others are forging ahead with the sale of their stock and still others are undecided, waiting for a bright sign in the market by year's end.

Display Data Corp. decided two weeks ago to postpone its public offering, which would have been its debut in the stock market. "We could go public tomorrow and sell out, but the issue is what price you get for that stock," Robert F. Barron, vice-president of finance, remarked.

The company's underwriters and management will determine when the time is right for the sale of the stock, Barron said.

According to the company's prospectus, the offering of one million shares had a tentative price of \$14 per share. The five-year-

old firm, which specializes in turnkey systems, had sales of \$18.3 million for fiscal 1978 ended August 31. Earnings were \$1.6 million.

Ramtek Going Ahead

In contrast, Ramtek Corp., which does not yet have a public market for its stock, is planning to go ahead with its first offering. In recent weeks, however, the company's management has been holding meetings with its underwriters to assess the exact timing for the issue.

The situation boils down to how much of a penalty Ramtek is going to have to swallow in a skittish market. "If we are going to be penalized 15% because the market is down, then that's probably tolerable. If we are going to get a bigger penalty in pricing our stock, then we will withhold," Ramtek's president and chairman of the board, Charles E. McEwan, noted.

Ramtek's prospectus anticipated the price of the stock would be between \$10 and \$12, but "we won't establish a final price until the night of the offering," McEwan said.

As far as McEwan was concerned when interviewed, his company is going ahead with the sale of the issue. "Our financial figures are based on a year-end audit in June; if we go beyond a six-month period for a full audit, our underwriters will probably require a

(Continued on Page 94)

Struggle With Debt Level Spurs Calcomp to Adopt Sales Accent

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. — An "overwhelming need" to ease an unmanageable debt level has caused management at California Computer Products, Inc. to shift the company's emphasis from manufacturing to sales and distribution.

To reduce its debt and minimize spending on manufacturing and research and development, Calcomp recently sold off its Memory Products Division to Xerox Corp. and established a separate minicomputer peripherals marketing department.

In addition, a revenue-sharing arrangement recently negotiated with Insac Data Systems Ltd. of London is under way. The two companies will share investment costs as well as the revenue gained from developing 15 application packages for Calcomp's IGS-500 interactive graphics system.

"The sale of the Memory Products Division raised enough cash to reduce debt," George Canova, Calcomp's president, explained. "In the new peripherals marketplace we can offer products manufactured by others without the R&D expense needed to develop those products or the working capital requirements for buying inventories or financing receivables."

Calcomp sold its Memory Products Division to Xerox for \$25 million in cash. The lion's share of the proceeds from the sale will be used to retire debt, which recently stood at more than \$42 million. The debt repayment will reportedly save Calcomp about \$2.5 million in annual interest expenses.

"Stalled" was the word Canova used to describe the financial picture at Calcomp for the past four or five years. "We were profitable in 1978 and 1977, but for the three years previous to 1977 we incurred losses," Canova said.

He attributed those losses to R&D expenses and high debt costs. The journey into debt began in the early 1970s, when Calcomp began to diversify its profitable plotter and interactive graphics line, branching out into manufacturing IBM plug-

(Continued on Page 96)

For Third Quarter

DP Trade Balance Favorable

WASHINGTON, D.C. — Imports of computer and business equipment totaled \$568 million in the third quarter of 1978, a 43% increase over the third quarter of 1977, according to statistics compiled by the Computer and Business Equipment Manufacturers Association (CHEMA). Exports were \$1.3 billion, up 29.1% over the year-ago quarter.

Those figures provide a favorable balance of trade for the industry of \$749 million, a 20.2% increase over the 1977 quarter.

The first nine months of 1978 showed a positive balance of trade of \$1.99 billion for the industry for an increase of 16% over the \$1.71 billion reported for the first nine months of 1977.

Exports rose 26% during the three-quarter period, from \$2.78 billion in 1977 to \$3.62

billion in 1978. Imports, however, experienced an increase of 40% from the \$1.16 billion reported in 1977 to \$1.63 billion in this year's nine months.

Computers and related equipment account for more than 80% of the industry's current year-to-date export total, according to CHEMA. Exports of that equipment for the first nine months had \$1.9 billion value compared with \$1.7 billion a year ago.

The level of exports for parts for computers and peripherals in the 1977 period was \$658 million and rose to \$1.1 billion in the first three quarters of this year. Imports rose 41% from \$184.2 million during the first nine months of 1977 to \$261 million for the same period in 1978.



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Fourfold Leap Predicted in CRT Graphics Mart

WELLESLEY, Mass. — Growing use of raster scan technology and emerging applications areas will set the pace for a four-fold leap to more than \$1 billion in the CRT graphics market by 1983.

The \$275 million interactive graphics market will skyrocket in the next five years as it gains a strong foothold in business applications, according to a Venture Development Corp. (VDC) market study.

Management information will be the single largest application for graphics in the early 1980s, when the business graphics market will hit \$243 million — equivalent to the shipping of 111,000 terminals, the study predicted.

By that time, computer graphics will be available not only in virtually every

engineering laboratory, but will also be used routinely for generating management reports, VDC said.

Raster Scan Market

Spurring the growth in CRT graphics is raster scan — or digital television — display technology, which will experience a surge of its own during the five-year period, according to VDC.

The raster scan display market will grow 60% per year, the study forecast, outpacing both random scanners (vector or strobe) and storage tubes as the most popular graphics display technology.

Currently holding 31% of the graphics market, raster scanners will capture the lion's share — 74% — by

1983. Random scan technology will climb 18% yearly, but its share of the market will decline from 30% to 16% by 1983, the study said.

Storage tube technology, originally developed by Tektronix, Inc., for storage oscilloscopes, will bite the dust as the leading graphics display technology, increasing a meager 1% annually in dollars into the 1980s, VDC indicated.

While its market share will drop from 39% to 10%, direct view storage tubes will continue to be the most widely used technology in computer-aided design/computer-aided manufacturing (CAD/CAM) turnkey systems because of superior resolution.

Tektronix, however, is not counting on the storage tube alone to secure its

hold as leading graphics terminal supplier, VDC noted. The vendor recently came out with both monochromatic and color raster scan-type graphics displays.

Raster Scan Benefits

Sales of raster scan terminals are taking off because they surpass both storage and vector technology in the ability to process photographic images such as those obtained from earth satellites and X-ray scans, VDC said. In addition, the raster scanner can selectively erase parts of a picture and display a wide range of color shades and intensities.

While competing display technologies provide better picture resolution, VDC noted raster scanners cost less at lower resolutions.

In fact, the prices of CRT graphics terminals will steadily decline as the cost of memories and semiconductor packages continues to plummet, the study predicted. Because interactive graphics terminals are cheaper to use, VDC said they already are displacing alphanumeric terminals in many applications.

Another advantage of CRT graphics terminals is that they do not require skilled labor to operate, VDC pointed out.

One indication of increased expectations for CRT graphics is the rapid growth of many companies in the industry. For example, VDC said, Computervision — the industry leader in turnkey CAD/CAM graphics systems — has been able to triple its stock price in the last nine months.

Although interactive computer graphics promises to be a hot business in the next few years, it will become harder to compete because of rapid technology changes and volatile prices. A number of CRT graphics equipment manufacturers that were active in the early '70s — including Photon, Data Disc and Computek — have since dropped out, the report said.

Suppliers to this industry will have to keep up with persistent advances in terminal speeds, resolution and intelligence, in order to stay in the running, VDC warned.

"The CRT Graphics Terminals and Systems Markets" report costs \$1,375 from 1 Washington St., Wellesley, Mass. 02181.

Supershorts

Xitan, Inc. has consolidated all East Coast manufacturing, microcomputer hardware and software engineering and service operations into a 40,000 sq-ft facility in Hanson, Mass., to provide more production space for handling a backlog of more than \$18 million.

Tratec, Inc. has increased its regular semiannual cash dividend by 20% to 4 cents a share.

National Systems Analysts, Inc., a DP consulting firm, has acquired Quad Data Associates, Inc. Quad Data will operate as a subsidiary of National System Analysts and will provide programming services, turnkey systems and a municipal accounting package.

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Expands Corporate Headquarters

Jilted by George, CSD Rallies With Own System

CINCINNATI — Computer Systems Development, Inc. (CSD) is expanding its corporate headquarters here and gearing up its manufacturing capability to produce its new small business system.

CSD was formed earlier this year in anticipation of buying Cincinnati Milacron, Inc.'s (CM) George line of small business systems. In July, CM refused to extend the time limit for the consummation of the sale to CSD [CW, July 17].

That refusal left a wake of disapp-

Micro Growth Hinges on Chips: Pactel Report

LONDON — Despite advances in chip technology, the growth of microcomputers in Western Europe will ultimately hinge on how, when and if industrial designers use this technology.

Technological improvements and offerings of 16K-, 32K- and 64K-bit random-access memories (RAM) will not be enough to set the micro market off on its potential 31.9% growth cycle through 1986, according to a market report by PA Computers and Telecommunications Ltd. (Pactel).

Whether this \$105 million market reaches a projected \$832 million in eight years will depend largely on how successfully the micro can wend its way into new application areas, the report noted.

Currently, computers and terminals account for 61.5% of the European micro market, but Pactel predicted this percentage would drop nearly 50% by 1986, when telecommunications and the automotive industry become more committed to the technology.

Competitive Picture for Micros

The competitive picture in the microcomputer business appears to mirror that of other computer markets, Pactel noted. What IBM is to mainframes and Digital Equipment Corp. is to minis, Intel Corp. is to micros, with 52% of the European market and little erosion likely.

Competitors will decrease in number, Pactel forecast, because of inevitable acquisitions and mergers. To survive, suppliers as well as users will have to respond quickly to technology and market shifts.

Titled "The Microcomputer Marketplace in Western Europe, 1978-1986," the report costs \$995 from Pactel, 33 Greycoat St., London SW1 P2QF, England.

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pointed distributors, at least one of which is suing CM, as well as a company without a product, according to CSD President Wayne Sennett, former manager of CM's Computer Division.

Now, however, Sennett's company has rallied and has introduced a microprocessor-based small business system for stand-alone or distributed processing use (see story on Page 73). Sennett claimed CSD's small business system is the first to incorporate Intel Corp.'s 8086 microprocessor design and is expected to compete directly with IBM's Series/1.

The processor will cost about half as much as the Series/1, according to Sennett. CSD's small business system

line will be priced in the \$10,000 to \$35,000 range and will target the low-end system user.

Distributor Network

Although CSD's two-person marketing staff is still in its fledgling stage, Sennett anticipates selling CSD products through a distributor network similar to that used by CM. "After all, I was the author of Milacron's distributor network," he explained.

However, Sennett expects CSD will foster a closer relationship with its distributors than did CM. The company is looking into the possibility of forming limited partnerships with some companies signed on as distributors.

Sennett doubts that CSD will be able to pick up CM's distributor base because many of CM's distributors have taken on other small business lines.

Initially CSD will offer the standard business applications software for its systems, Sennett noted, but will introduce a construction package in January and one for certified public accountants in February.

Right now, CSD is gearing up to produce the small business system. According to Sennett, the beefing up of the manufacturing capability is being spurred by "interest in an intelligent interface control for rotating Winchester-type storage devices that are now in limited production."

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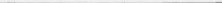
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Philippine Islands Seen A Logical Site For Setting Up Central Pacific DP Capital

ANAHEIM, Calif. — The Philippine Islands are a logical site for the Central Pacific's computer capital, and the establishment of a strong computer industry there may be a reality by the mid-1980s, an industry executive predicted on his recent return from Manila.

The combination of low-cost labor

and a highly educated populace makes Manila the logical place for establishing both manufacturing plants and sales offices, William Terry, vice-president of marketing for the Data Products Division of Lear Siegler, Inc., reasoned. "Even though the nation has been independent for 20 years, the basic psychology of the country is oriented to the U.S.," he asserted.

There are more college graduates per 1,000 people in the Philippines than in any other country outside the U.S., Terry noted, pointing out that an educated work force is in place. Moreover, the pay scales are very reasonable.

An industry chief executive who would command \$75,000 in the U.S. would be paid \$40,000 in Manila. A technical person paid \$25,000 in Southern California would probably earn \$8,000 in the islands, he said.

In addition, Philippine businesspeople usually speak fluent English. Terry concluded that the education level, pay scales and English fluency in the Philippines gave that nation "substantial advantages" over Hong Kong, Japan and Singapore.

There are 250 to 300 DP systems in operation in the Philippines today,

Terry claimed, adding that the trend there is toward turnkey systems development.

Future Plans

Terry envisions a range of software exporting firms establishing bases in the Philippines by the end of the decade and a core of American manufacturers producing hardware there by the early 1980s.

The Philippine government is currently researching the capability to develop computer systems among the islands that comprise the nation.

Lear Siegler set up a distributorship in the Philippines last August and is exploring other business arrangements there, Terry said. The company exhibited its products at the recent Regional Computer Conference sponsored by the Association of Southeast Asia Nations.

"However, the kind of sales sophistication that we have in the U.S. doesn't exist in the Philippines or anywhere in Southeast Asia, for that matter," Terry observed. One solution to that problem, he suggested, was bringing Philippine college graduates to the U.S. for six months of specialized training.

Executive Corner

• Dennis M. Mannion has been named vice-president of operations at Documation, Inc.

• Alex Bernstein has joined the Brandon Consulting Group as a senior consultant.

• David C. Pixley has been named by the board of directors of Genesee Computer Center, Inc. as president and chief executive officer, and Kurt Enslein has been named senior vice-president and chief scientist.

• Robert B. Hawkins has been named executive vice-president of Control Data Corp.'s Computer Group. He will be in charge of managing the company's activities in international ventures and cooperative programs involving technology exchange.

• Paul J. Mozola has been named vice-president of the Midwestern region of Data Processing Security, Inc.

• Byrne O'Brien has been named director of administration and finance and Michael Nugent has been named staff attorney at the Association of Data Processing Service Organizations.

• Jack Robinson has been appointed regional marketing director for the Midwest and West Coast operations of Data Access Systems, Inc.

• Thomas Frenier has joined Dearborn Computer Co. as controller, Jack Hughes has joined as its manager for the Western region and Robert Meyer has joined as manager for the Northeast region. Another new employee, Robert Neumeyer, has been appointed product manager, and William Eick is the firm's new regional manager of software sales.

• Leland C. Fay Jr. has been named president of Evidex Corp., a Chicago-headquartered litigation support service company.

• John J. McElroy has been appointed president of Interactive Data Corp.

• R.E. (Bob) McKeon has joined ITT Courier Terminal Systems, Inc. as vice-president of field engineering.

• Daniel Toth has been named vice-president for communications industry marketing for the Infonet Division of Computer Sciences Corp.

• A.C. Rice has been elected to the board of directors of Tandem Computers, Inc.

• Juan A. Rodriguez has been appointed vice-president and general manager of Storage Technology Corp.'s Disk Division.

• Joseph J. Kroger has been named president of Univac's Marketing and Services Division and Paul J. Spillane has been named president of the firm's Products Division.

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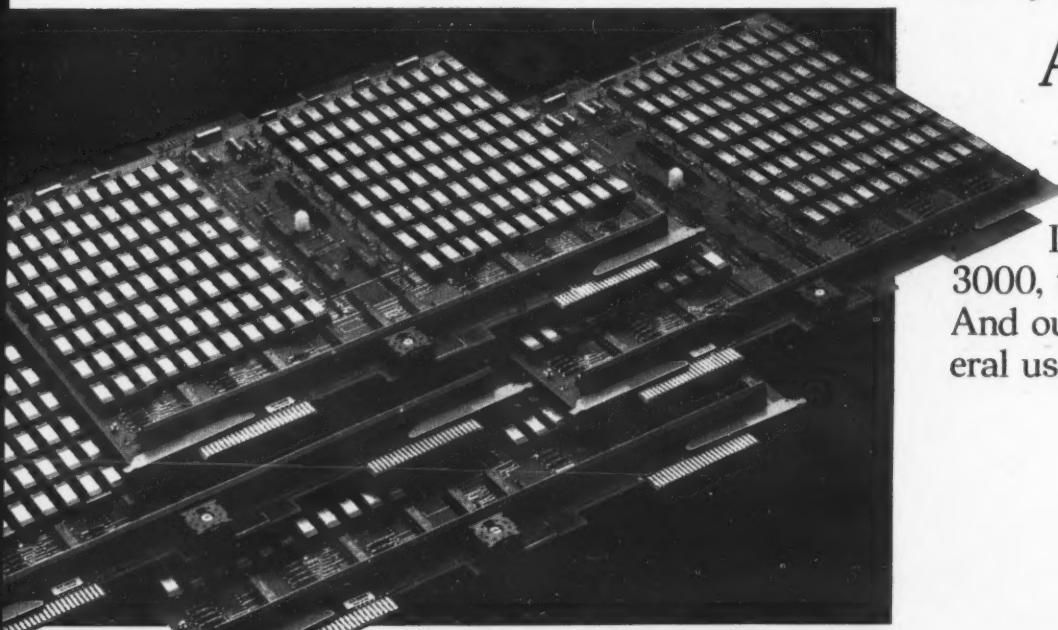


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Stock Offering Reactions Mixed in Jittery Mart

(Continued from Page 87)

reaudit," he pointed out.

Besides the problem of a reaudit, McEwan said, "we've been growing at about 35% to 40% per year. Retained earnings cannot sustain that growth rate. Our choice if we don't go public is to reduce our growth curve." He was not particularly happy about the prospect of reduced growth.

Modular Computer Systems, Inc., an established firm on the stock market, has withdrawn its stock offering, thereby limiting its opportunity for growth. The stock was trading at \$15 a share earlier this year and is now priced at about \$9.

Modcomp withdrew its offering for two reasons, according to Kenneth G. Harple, its president. "The main reason we withdrew was that the market was down and, since it was so close to the end of the year, our underwriters would have insisted upon reaudited financials," he said.

"Also, we had a large loss in 1976, but when we filed, the Securities and Exchange Commission questioned whether the loss was really incurred in that year. We are now doing an analysis, which is complicated because the records are so old."

The company's bank line will be adequate financing for the next one or two years, Harple added. However, bank financing will require running the company much more conservatively, he indicated.

With equity funding, Harple said, Modcomp could have looked for growth through acquisition, an option which the company will not now consider.

"We don't anticipate any serious cutbacks in our operation, but if we had the opportunity to double now, we wouldn't double, we would control our growth," Harple maintained.

Two Firms Undecided

Still looking for a clearing of the stock market clouds are Computervision Corp. and Data Dimensions, Inc. Data Dimensions' filing will be effective the week of Dec. 18.

"If the market is good and the stock is at a reasonable price, we will go ahead," Lester Gottlieb, president, said. On the day he was interviewed, Gottlieb said, "today I wouldn't do the deal."

Data Dimensions has not raised equity capital since its initial offering in 1969. The company's stock was recently trading at \$5.50 per share, down from \$8.75 when the firm filed with

the Securities and Exchange Commission in August.

Data Dimensions' underwriting agreement states the firm does not have to go forward with the offering if the stock price is less than \$7 per share. Should the company decide to withdraw its offering, it will not proceed with another offering until late spring, Gottlieb said.

The firm would use equity capital to reduce debt and for lease financing, he added.

Martin Allen, president of Computervision, isn't particularly concerned about whether there will be a market for the company's stock. The price is what bothers him.

"The stock is considerably underpriced based on any reasonable mea-

sure," he said. In August Computervision was trading at \$25 a share. It later slipped to \$18 and has since recovered to about \$22.

While not proceeding with the public issue would require more careful asset management, the company is going forward with its expansion plans regardless of whether the stock offering is made, Allen said. Part of that growth plan includes the addition of about 350,000 square feet of space to various divisions.

MCI Going Forward

MCI Communications Corp. intends to go forward with its sale of stock. "The market is stabilizing from its rundown in October and November," V. Orville Wright, MCI president,

said. The company's stock was trading at \$5.75 in late September and was recently priced at \$4.

The capital raised from the offering will be used for debt payments and for working capital for "market opportunities provided by two recent court decisions on Execunet," Wright said.

Regardless of the mixed bag of responses from companies planning public offerings, Roy Rogers of Hembrecht & Quist said the prices on the market have adjusted downward by about 20% to 30%.

As a whole, the market now is priced at an average of nine to 10 times projected earnings; earlier in the year, prices were based on 12 to 13 times projected earnings, Rogers noted.

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Dr. J. Egil Juliusen
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Richard L. Nolan, Chairman, Nolan, Norton & Company



"Planning to Manage the New Systems Technology in the 1980's." Managing and adapting to fast-paced changes in technology and marketplaces; cost-benefits analysis and cost control.

James E. Thornton
President, Network Systems Corporation



"New Alternatives in Systems Architecture." Will conversion/migration between non-compatible systems be easier by 1982/83? More or less costly? And what innovative architecture choices are open to users now?

James McGuire
President, Computer Division, National CSS



"Computer Services, User Hardware Hybrid Systems." Why are the service companies now supplying their own hardware? What's next?

Dr. James W. Jewett
Vanderbilt University, and President, Telco Research Group



"Communications Systems — Optimizing 1980 Alternatives." How can users select from new carrier offerings in the packet and satellite areas? What compromises and trade-offs are needed with existing communication network investment?

Additional speakers to be announced.

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Energy Efficiency Up

WASHINGTON, D.C. — The computer and business equipment industry attained a 33.4% improvement in energy efficiency since 1972.

This figure and other statistics were part of a required report recently made to the U.S. Department of Energy by the Computer and Business Equipment Manufacturers Association (Cbema).

Since the 1972 base reporting year, space devoted to manufacturing has increased 17.5%, Cbema noted. However, total energy consumption in British Thermal Units (BTU) has decreased across the industry by 19.2%.

If energy conservation measures had not been taken by companies in

the industry, total BTU consumption would have reached 22.4 trillion BTUs for the six-month reporting period. Instead, a decrease to 14.95 trillion BTUs occurred in the first half of 1978, the report indicated. Production space for 1978 was 107.4 million sq ft.

During 1972, BTU consumption was 18.5 trillion per half-year for 88.6 million sq ft of space.

A distribution analysis of the various energy sources indicated that although there was a slight increase in the use of gasoline, the major energy source for the industry continues to be electricity. Electricity accounted for 48.8% of all energy consumption, natural gas for 32.54% and fuel oil for 17.47%.

CI Notes

Radio Shack Opening Modularized Stores

FORT WORTH, Texas — By the end of this week Radio Shack will have opened three modular concept stores which will feature separate department layouts for the company's three newest product lines in addition to standard Radio Shack products.

A computer department will be included in these "Super Shacks," as one spokesman dubbed the store concept.

"The modular area in the three new retail locations is not the same as the design or purpose of the Radio Shack Computer Centers we are opening in major markets," Radio Shack President Lewis Kornfeld said.

The modular concept stores will not carry the complete line of computer products offered by the centers, but will rather stock the more popular products. Some customers already know what computer products they want to purchase and do not require the full depth of expertise the Computer Center Stores offer.

While the company is not sure of the modular stores' final effect, the concept was designed to attract business, the spokesman said. The three stores will be located in New York, Washington, D.C. and Chicago.

Meanwhile, the company is also gearing up to establish 50 Radio Shack Computer Centers by the end of May, the spokesman said. To date seven centers are in operation.

Exhibit Bookings Set Record For Interface '79 in Chicago

CHICAGO — With more than four months left until the show, the Seventh Annual Interface Data Communications Conference and Exposition has already booked a record amount of exhibit space.

The sponsoring Interface Group reported that 172 companies have booked nearly 80% of the 834 available booths for the show, which will be held April 9-12 here at McCormick Place.

A total of 220 suppliers of computer/data communications hardware, software and services is projected to exhibit at the show, which would represent a 25% increase in the number of companies and 50% increase in the amount of space compared to Interface '78.

Attendance is expected to be a record 15,000, compared with 8,000 at Interface '78, according to Sheldon G. Adelson, president of the Interface Group.

Adelson attributed the growth of the conference to the increased computer and communications market and to Chicago's importance as a regional computer base. He said 25% of non-salary DP budgets now go for data communications hardware, software, distributed data processing, networking, line charges and other communications costs.

The national Interface show is now the largest data communications conference in the world and second largest computer-related show in the U.S., Adelson claimed.

Interface '79 will be the only major computer conference in the Midwest next year, Adelson said. Other Interface Group conferences during 1979 will be the Federal DP Expo, March 9-21 in Washington, D.C., and Interface West, Oct. 30-Nov. 1 in Anaheim, Calif.

Electronic Arrays to Merge With NEC's U.S. Subsidiary

MOUNTAIN VIEW, Calif. — The shareholders of Electronic Arrays, Inc. have approved the merger of the company with the U.S. subsidiary of Nippon Electric Co. Ltd. (NEC).

The shareholders will receive \$5 in cash per share in exchange for their Electronic Arrays common stock.

Electronic Arrays manufactures and markets MOS large-scale integrated semiconductor circuits.

Host Organization and Registration Information

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sentations by skilled speakers, as well as audience involvement in pre-conference studies and issue definition.

ACT Advanced Computer Techniques Corporation is an international firm that provides management, product planning, and product implementation services in a wide variety of areas within the information systems industry. These services include: facilities management, feasibility studies, problem analyses, systems analysis, office automation, service bureau operations; programming project management and systems application software development.

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- User acceptance of AT&T's ACS/IBMs SNA.
- New technology/applications impact of IBM's System 38.
- Potential for low and mid-priced plug-compatible processors (NCSS, Nanodata, ITEL etc.)
- Software in firmware/microcode.

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Struggling With Debt, Calcomp Stresses Sales

(Continued from Page 87)

compatible tape and disk memories.

"The rapid price changes and the kinds of competitive actions for which we sued IBM have affected our ability to compete in the plug-compatible marketplace," Canova lamented. Although Calcomp has now completely ceased manufacturing IBM plug-compatible equipment, it will continue to purchase that equipment from other vendors and sell it to both its existing customers and new sales prospects.

However, Calcomp will continue to manufacture its "bread and butter" plotter and interactive graphics products, Canova said.

The markets Calcomp is exploring, such as minicomputer peripherals and software packages, are being chosen

"dependent on the amount of capital needed to exploit those markets and our company's strengths," he continued.

Canova described the minicomputer peripherals venture as essentially a distributorship. "We already are end user-oriented and have a large sales and field service organization throughout the country."

The difference is that now Calcomp will purchase a wide range of peripheral products from other manufacturers, put the Calcomp label on the equipment and offer local service. The new sales group is separate from the existing sales force and will not sell IBM plug-compatible peripherals.

Currently the minicomputer peripherals marketing department is touting

a line of printing systems for use with Digital Equipment Corp.'s PDP-11 and Data General Corp.'s Nova and Eclipse computers as well as three disk storage subsystems for use with DEC's PDP-11.

The first in a group of products called the "Supermini Series," Calcomp is already selling these products in three major metropolitan areas.

Prices for the printing systems range from \$10,200 to \$29,800. The disk subsystems are priced between \$20,800 and \$33,900. In both cases installation is included in the purchase price. By 1979, Calcomp said it will introduce a magnetic tape system, add-in and add-on memory and terminals.

While these products do not offer appreciable savings over DEC or DG

products, Canova noted that, in many cases, they offer higher performance and give users the "security blanket" of local service backing.

Excited About Venture

Canova is excited about the revenue-sharing venture with Insac. "We just shipped an interactive system to Insac so it can develop application programs," he said.

Supplying the equipment is Calcomp's investment in the software development project, he explained.

The venture calls for Insac to develop 15 application programs for Calcomp's IGS-500 system. The contract is likely to involve a team of about 20 people working in the UK for several years, an Insac spokesman said.

The first products, an isometric engineering drawing system and a utility mapping system, are scheduled for introduction in early 1979.

As Calcomp sells its graphics systems and the Insac software, the two companies will begin to share the revenues from those sales. "The revenues will not necessarily be split 50-50," Canova added.

With the realignment of its product line, Canova predicted Calcomp's revenues and earnings will grow "at least as fast as the computer industry — about 15% to 20% a year."

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W. Germany	6,527	7.9	3
United Kingdom	4,794	5.8	4
France	4,768	5.8	5
Canada	2,301	2.8	7
Italy	2,119	2.6	8
Australasia	2,044	2.5	9
Brazil	532	.8	17
Middle East	328	.4	22

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"If 'Open Sesame' Won't Work, Try These Computer Codes."

By Western Standards

Soviet DP Industry Still Lagging After 25 Years

By Irwin Ross

Special to CW

Although the Soviet DP industry marks its 25th anniversary this year, by Western standards it is still an upstart without the financial or technological resources to create a computerized society.

The best Soviet-made computers are believed to lag at least three years behind American systems in processing ability, eight years in memory capacity and a decade in peripheral apparatus.

Soviet software is said to be about a decade behind American capabilities.

Western experts estimate there are at least 80 computer-producing plants in the Soviet Union, with more than a half million workers assigned to the manufacture or use of computer equipment.

However, there are only about 25,000 computers in Russia, one-third of which are being used for nonmilitary purposes. By contrast, the U.S. has more than 300,000 computers, with three-quarters of them in commercial operations.

While the average American does business with a computer about 10 times a day, the average Soviet can go for months or even years without interacting with one.

There are no credit cards or charge accounts in department stores in Russia, no automated deposit and withdrawal systems at banks and no computerized reservation systems in hotels or on the domestic flights of Aeroflot airlines.

The situation would appear

to be a promising one for American computer manufacturers, a handful of which maintain offices in Russia. But to date the Soviets have been bearish buyers, purchasing only a limited number of extremely complex systems and showing little interest in workaday machines that handle such pedestrian chores as payroll or DP.

As one Western computer salesman said of the Soviets, "They buy either for very big projects where they can't possibly get by without the latest models or for projects like the Olympics, where they have their prestige on the line and can't afford to look bad. They always buy a total package, with training and maintenance contracts included."

Kama River Plant

The foundry at the Kama River truck plant — the largest such facility in the world — is controlled by a \$10 million IBM 370/145 system. IBM has also sold systems to the Intourist organization, which is finally going to automate its overseas reservations processing, and to the Soviet Olympic committee for use at the 1980 Moscow games.

Honeywell, Inc. systems have been purchased by the state bank in Leningrad, the Zil truck plant in Moscow and the Izhevsk motorcycle factory in the Urals. Aeroflot's international operations are now being handled by a \$5 million Univac system.

But for the most part, the slow-going, often slipshod

computerization of Soviet industry is being accomplished with locally produced machines.

Hopes for Future

American representatives admit that sales have not lived up to the expectations they had when they first arrived in Russia, but what keeps them from packing up and going home is the belief that eventually things have to get better.

"This economy demands growth to keep it going," one American explained. "To get growth, the Soviets either have to put in new capital and labor or improve productivity.

"Capital is tight, and they can't count on increasing their labor supply much longer because the population growth rate isn't high enough. So that leaves only one option — improving efficiency and increasing productivity. The best way they can do that is to computerize industry.

"Take one example. Right now there is probably no machine-tool monitoring in Russia. They have no way of knowing just how fully their equipment is being utilized. How much longer can they go on like that?"

Nevertheless, no one expects the situation to improve dramatically in the future, since the Soviets are painfully short of hard currency and spend most of what they have on grain and oil and gas drilling equipment.

Lengthy Delays

Soviet-American computer deals cannot be finalized without a U.S. government export license, and manufacturers complain that sales are being hurt by unnecessarily long delays and cumbersome licensing procedures. Some sales take longer than one and a

half years to be approved, while others are eventually turned down.

For example, last year, Control Data Corp. was denied

in Russia at that time. Also, the Soviet Union, unlike the U.S. and other Western countries, never developed a high-powered calculating apparatus industry.

The first Soviet computer was designed in 1948, but production was postponed until 1953, mainly because an ideological campaign was being waged against the new machines and the "bourgeois science" of cybernetics that had developed them.

The principal reason the Soviets are so far behind in computer design, experts believe, is their inability to master chip technology — placing large numbers of miniature circuits on tiny silicon chips or plates about one-half square inch in size.

U.S. engineers can cram up to 50,000 components on a single chip, while the Soviets have difficulty placing 2,000 components on a chip.

Own Problems First

At least one Western source believes the Soviets must iron out the bugs in their own computer industry before they will begin purchasing a significant amount of computers and computer-related equipment from the West.

"Most of their allocations for computers are going to be spent on developing their own capacity to satisfy their own need," the source said. "And from their point of view, that's the only approach that makes sense. Then they can worry about purchasing specialized equipment that is too expensive or too tricky for them to manufacture.

"And when that happens, Western computer firms are going to start making big money in Russia."

Ross is a Chicago psychologist.

Analysis

permission to sell the Soviets its ultramodern \$13 million Cyber 76, which the Soviets said would be used in weather forecasting. The U.S. feared it would give the Soviets vital information about CDC's Cyber 74, which is the brain of the U.S. defense system.

Licenses generally impose certain conditions on sales, and the manufacturer frequently is required to monitor his machine for months or years to make sure the Soviets are using it only for the purpose listed on the license application.

In earlier years companies were often required to have an observer stationed at the job site, but today machines are programmed to make periodic memory drops that can be collected and sent to company headquarters.

Fundamental Problems

Western experts believe the shortcomings in the computer field in Russia result from the same problems that afflict Soviet industry in general: a debilitating research and development lag, a low level of technology and production techniques, a lack of communication and coordination between manufacturers and a lack of quality control.

In addition, the computer industry got off to a late start because it had to develop practically from scratch, since neither the machine industry nor the electronic equipment industry was well developed

Memorex to Supply NCSS

SANTA CLARA, Calif. — Memorex Corp. has received a \$4.9 million contract from National CSS, Inc. (NCSS) for Memorex 677 disk storage drives, Model 1270 terminal control units, disk controllers and related services.

NCSS, a major time-sharing organization, will use the Memorex equipment in its 3200 distributed processing mini-computer system that employs IBM 370-compatible software for data base management and in-house timesharing applications.

Memorex started shipping the 1270s and 677s in June and will deliver the bulk of the equipment over a two- to three-year period.

Other Awards

Control Data Corp. has received a \$1.2 million contract for a central DP system at Patrick Air Force Base, Fla. The system will provide range safety data for the Trident missile test program.

Computer Devices, Inc. has signed a contract to provide

Contracts

Applied Devices Corp. was one of two companies awarded an \$18.8 million contract to provide and manage systems equipment for an electronic lottery game operated by Quebec province. The other company is Comterm Ltd., based in Pointe Claire, Quebec.

Computer Sciences Corp. has been awarded a \$129.6 million contract to process claims for California's Medi-Cal program. The contract runs for 5 1/2 years.

The Software Co. has entered into a contract with Service Aids, Inc. for the purpose of designing, developing and installing an interactive software package.

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Sweda Gets Housewares Chain's POS Order

PINE BROOK, N.J. — Sweda International has received a \$2.35 million order for 50 point-of-sale (POS) cash registers from Handy City, a retail houseware and hardware division of W.R. Grace & Co.

After a one-year study of all manufacturers' POS equipment, Handy City selected Sweda Model 800 cash register terminals and Model 8805 data collectors to help track its merchandise by product line, the firm said.

Sweda will deliver POS systems to Handy City's 23 existing chain stores and to 27 new stores by the end of next year.

Other Orders

American Medical International, Inc., which owns and operates more

than 50 acute care hospitals around the world, has ordered 18 I-8200 systems from the NCR Corp. as part of a distributed processing network. The systems are valued at more than \$1.3 million.

Peoples Drug Stores of Maynard, Mass., has placed a \$1.1 million order with Data Terminal Systems, Inc. (DTS) for 500 Model 440 stand-alone electronic cash register systems. The Jack Eckerd Corp. has ordered 1,000 DTS Model 220 systems valued at \$1.25 million. Eckerd is headquartered in Clearwater, Fla.

The General Services Administration has purchased 17 Model 1200 printing systems valued at \$2,040,000 from Xerox Corp. They will be used in general business applications, such as ac-

counting, inventory control and payroll.

Accounting Systems Corp. has ordered 21 Model 404 distributed data entry and processing systems from Sy-

million from NCR Corp.

Wal-Mart Stores, Inc., a discount department store chain, has ordered 1,000 Model 440 electronic cash registers from Data Terminal Systems, Inc. for \$2.75 million.

Tandy Corp. has ordered 250 System 70 small business systems from Applied Digital Data Systems, Inc. The order is valued at approximately \$1 million.

Wiener Corp., a New Orleans-based retail shoe and apparel chain, has purchased 100 Model 2200 point-of-sale terminals and 100 Model 2300 OCR-A readers, with supporting polling and conversion and editing software, from Chase Computer Corp.

William M. Wilson's Sons, Inc., a manufacturer of gasoline pumps and fuel distribution systems headquartered in Lansdale, Pa., has ordered a 90/40 system from Univac for on-line purchasing, order entry, inventory control and engineering control.

Display Data Corp. of Hunt Valley, Md. has ordered 5000 Regent CRTs from Applied Digital Data Systems, Inc. The value of the agreement is estimated at more than \$3 million.

Cole County, Mo., has ordered its first system, a Univac 90/30, which will be used for local government applications.

The Fermi National Accelerator Laboratory has ordered three Cyber 175 systems from Control Data Corp. The contract is valued at approximately \$10.6 million.

CPU, Inc., a DP service bureau that serves credit unions, has ordered 100 Model 290 on-line CRT systems from Sycor, Inc. The total purchase value is estimated at approximately \$1.6 million.

Ford Motor Co.'s Car Engineering Division in Dearborn, Mich., has ordered computer-aided design and computer-aided manufacturing systems from Computervision Corp. The orders are valued at \$1.4 million.

NLT Computer Services Corp., a Nashville, Tenn., direct mail firm, has installed an IBM Model 3800 printer. A second 3800 is scheduled for installation within the year.

The Amplex Division of Chrysler Corp. has ordered two Model 445 distributed data processing systems from Sycor, Inc. The systems have a value of approximately \$150,000 and will be used in the division's Detroit and Van Wert, Ohio, facilities.

Arby's, Inc. has ordered Model 2160 fast-food systems consisting of point-of-service terminals, a receipt printer, a slip printer and a microcomputer-based processor from NCR Corp.



EDP professionals have a word for the new Wang VS computer.

"Incredible."

Richard Berger,
Vice President
and Data Processing
Manager, Bug-
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"Because we had been using a computer—the Burroughs B1700—with card input sequential files and no video displays, we suffered long delays and storage constraints.

"Now, with our Wang VS system, storage is virtually unlimited, and we simply

recall a screen load of information on the CRT to make a change in seconds—all of this without interrupting our normal flow of work.

"We've put everything in our business onto our VS system, including payroll, accounting, sales and wholesale and retail inventory control. And we did it in 90 days without changing languages and with only minor modifications in almost 90 COBOL programs."

EDP professionals in more than 100 companies are singing the praises of the Wang VS. And for good reason.

The VS is a remarkably sophisticated, fully expandable virtual storage computer designed to provide maximum interaction in a mainframe environment.

The VS provides for distributed data processing, thus avoiding costly consumption of mainframe resources. It's fast, responsive, easy to use and can support up to 2.3 billion bytes of on-line storage. What's more the VS speaks EDP people's language: COBOL, BASIC, RPG II and ASSEMBLER.

We also think you'll appreciate how simple the VS is to operate. In fact, because of its level of sophistication, it can be operated by people with little or no computer-related training or experience.

One more thing: the entry level price of the VS is under \$50,000. Which is perhaps the most remarkable thing of all about this computer.

For more information on the VS, return this coupon to Wang Laboratories, Lowell, MA 01851.

"We are absolutely amazed at the throughput rate we've achieved with our Wang VS. On our very first job for one of the country's largest student insurance agencies, the VS arrived in Pittsburgh on December 23 and was completely installed and operational on-site on February 15, with 61 programs written, debugged and tested—all by only two people—and not a single line of code had been written until the machine came in the door.

"The VS really fulfills all of our requirements, particularly in areas where other systems are weak: cost/performance, language-availability, user utility software.

"I think the real key for the DP manager is the utilities available with the VS, its speed and its interactive COBOL compiler. These three things combined make for a very powerful tool."

J.P. Scott,
Data Processing
Manager,
Aptech Computer
Systems, Inc.,
Pittsburgh, Pa.

"Unbelievable."



Kenneth W. Cakebread, Manager of Data Processing, Trans-Air Forwarding and Brokerage, Inc., Inglewood, Calif.

"I had 30 days to convert about 220 programs from our old batch-oriented Honeywell 62 system to our new Wang VS system. Not only did I do it. Thanks to the programming power of the VS, I actually came up with more.

"Before we converted to the VS, the biggest problem we had in the accounts receivable area was misapplying cash.

No more. Now, by capturing current information and keying it into the computer from a workstation, we're able to sort out potential problems long before they get to the accounts receivable stage. And with Wang's on-line editing capabilities, I'd say we've cut our average editing time on a per-item basis from 30 seconds to a single second.

"And believe it or not, while the VS gives us faster access and maybe triple the programming efficiency of our old system, it was only half the cost."

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Sr Analyst -	Ind. Life-Northeast to \$28,000 Group Ins.-Midwest to \$28,000 Ind. Life-Southwest to \$25,000
Sr Programmer -	Ind. Life - ALC-Midwest to \$25,000 Ind. Life - ALC-Southwest to \$25,000 Ind. Life - COBOL or ALC-Northeast to \$27,000
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If you have 2 or more years experience and are currently working in the insurance field, call or write to discuss personally with Jack Edwards.

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COMPUTER SCIENTISTS & SOFTWARE ENGINEERS

WHO ARE WE?

One of the San Francisco Bay Area's fastest growing software systems developers wants you to consider the opportunities that we have for exceptionally qualified software professionals like you.

WHAT TECHNOLOGY ARE WE USING?

A strong program that blends IR&D, contracts and internal projects gives us the opportunity to participate in technological developments at the leading edge of software science. Our current high-technology contracts include:

★ secure operating systems development

★ distributed data-base studies

★ high bandwidth local computer networks

Here are some of the areas which are particularly important to Western Development Laboratories.

UNIX-based* Software Engineering

- PWB/UNIX
- Development support systems
- Software development tools
- Specification languages

(*UNIX is a trademark of Bell Laboratories)

Distributed Systems Technology

- Data base management systems
- Real-time data collection
- Local network prototypes
- Network protocols

Reliable Systems Technology

- Formal specification & program verification
- Secure computer systems
- Test and validation

Operating Systems Architecture

- Capability-based systems
- Network systems
- (micro, mini, midi, maxi)

WHAT JOBS DO WE HAVE?

Systems Development Programmer

You will use modern systems programming languages running in PWB/UNIX environment to develop operating systems, software tools, DBM's, and network implementations. These positions provide excellent opportunities for technical growth.

Operating System Designer

You will draw upon your experience with several operating systems, your academic training, and your ability to conceptualize and communicate in order to design and specify a new class of operating system. You will learn to express your design in a formal specification language and to subject your specifications to rigorous analysis.

Software Test Specialist

You will break new ground in design of test methods for provably secure systems. Using your familiarity with modern software testing methodologies, you will interact with the systems design team. As a result, you will become familiar with formal mathematical specification techniques for software.

Software Methodology Specialist

You will work in a PWB/UNIX environment to create tools to make the software development process more exact and less error-prone. Your major contribution will be the direction of research and development that leads to the next generation of software tools.

Programming Language Specialist

Your knowledge of modern compiler-building technology and formal languages will be used in the evaluation and development of systems programming languages for use in support of our reliable systems technology efforts.

Modula Expert

You will provide theoretic and practical leadership in the design and implementation of visibility, efficiency, and maintainability extensions to a UNIX-based modula compiler. You will also consult and instruct on the use of modula and BCPL.

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You will use your knowledge of MIL-S-52779 and modern software QA systems to develop and apply WDL-wide software QA methodologies. Knowledge of modern systems development practices and high level systems programming languages is also required.

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CAPEX needs experienced, aggressive, people-oriented project managers who know how to lead and manage a project of up to ten high capability programmers to produce quality software products for worldwide use. Responsible for staffing, organization, product design, implementation design, scheduling, technical leadership, and draft user documentation. If you know how to do it right in a top-down-design, structured programming, 360/370 environment then CAPEX needs you.

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You will have a degree in CS or EE; 2-5 years exclusively in design/development of a processor and/or system (not application) software.

- The working environment is highly stimulating with high visibility, receptivity to ideas and opportunity for advancement.
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Demonstrated experience in the design and implementation of large business systems combined with manufacturing or financial applications design experience in a data base/data communications environment (CICS/DL-1, etc.) are required for this position.

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DIVISION OF AVX CORPORATION



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PROGRAMMERS

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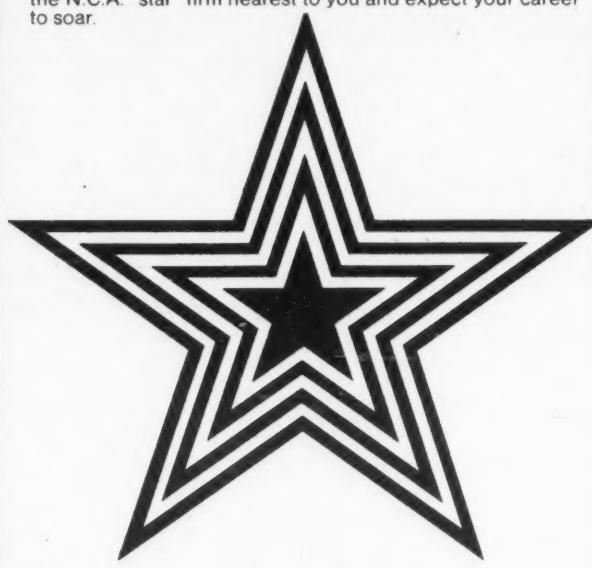
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- have an eye towards a management position
- are seeking an excellent compensation plan including high base salary, commissions, car allowance and expenses
- come and extend a successful sales career with us.

then

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If you

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- have at least 3 years' work experience with high level languages
- enjoy travelling and working with clients in a sales environment
- are interested in mini/micro computers and distributed processing
- are interested in an excellent salary, bonus, mileage and expenses

then

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As a result of our continued growth and expansion programs, openings now exist in all regional areas of the United States. If you would like to be considered as a new member of our team, call one of our regional managers in the region that interests you to arrange for an interview. Yes, we do have a relocation policy. Selected candidates should provide a detailed resume of their work history and accomplishments to:

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24320 Indoplex Circle
Farmington Hills, Michigan 48024
(313) 478-2640

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P.O. Box 4883
Anaheim, CA 92803
(714) 778-4800

Eastern Region:

Dale Greene, Sales Manager
377 Route 17
Hasbrouck Heights, New Jersey 07604
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- Minimum of 2 years of field or training experience as a Word Processing Customer Support Person.
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- Good written and verbal communication skills.
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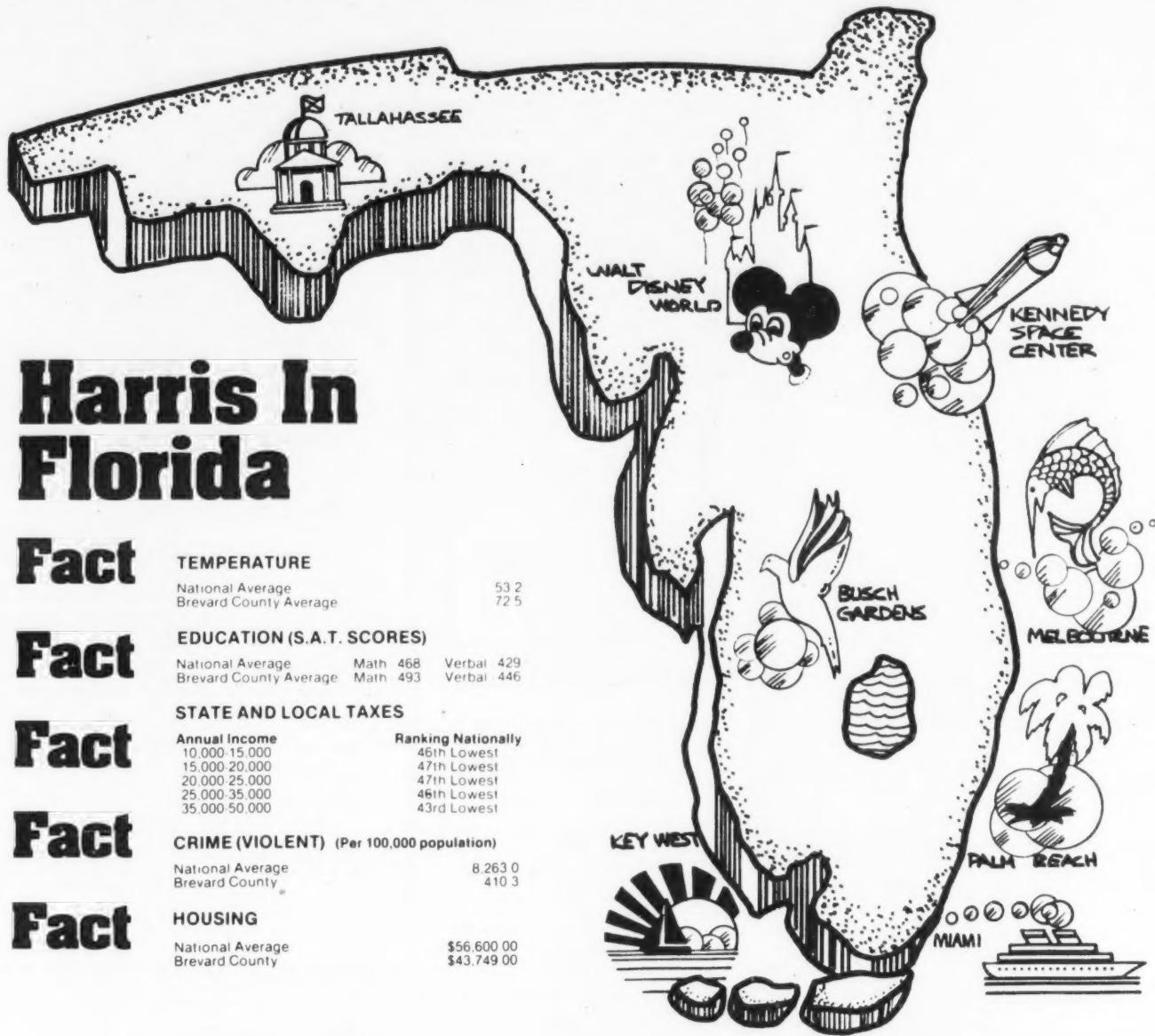
Fiscal 1978 was another record year in sales and earnings for Harris. Sales increased 35% to \$872 million. This trend reflects the growing importance of the communication and information processing industry in the world economy, and the emergence of Harris as a broad-based producer of equipment for that industry. For the first time new orders received in fiscal 1978 exceeded the billion-dollar milestone.

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Harris In Florida

Fact

TEMPERATURE

National Average	53.2
Brevard County Average	72.5

Fact

EDUCATION (S.A.T. SCORES)

National Average	Math 468	Verbal 429
Brevard County Average	Math 493	Verbal 446

Fact

STATE AND LOCAL TAXES

Annual Income	Ranking Nationally
10,000-15,000	46th Lowest
15,000-20,000	47th Lowest
20,000-25,000	47th Lowest
25,000-35,000	46th Lowest
35,000-50,000	43rd Lowest

Fact

CRIME (VIOLENT) (Per 100,000 population)

National Average	8,263.0
Brevard County	410.3

Fact

HOUSING

National Average	\$56,600.00
Brevard County	\$43,749.00

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We are looking for experienced, aggressive professionals to join the faculty of a rapidly growing program in Applied Computer Science. You should enjoy teaching and have a driving desire to be involved in the application of computer resources and systems techniques.

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Rank/salary open. M.S. required, PhD desired. Industry experience desired. Areas of special interest: systems development/design, on-line systems, micro-mini systems, data base.

Sound exciting? Contact: M.J. Powers, Dir. of ACS, Illinois State University, Normal, IL 61761.

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HONGKONG POLYTECHNIC



The Hong Kong Polytechnic is an expanding institution which is now putting into effect a forward looking development plan incorporating a credit-unit approach combined with a self learning system. The basic teaching departments are organized into three Divisions: Engineering, Applied Science and Commerce & Design, and broad interdisciplinary centres and Institutes - Textiles & Clothing and Medical & Health Care - which are relevant to the needs of Hong Kong.

The Polytechnic invites applications for the following posts which are tenable from 1st September 1979:

DEPARTMENT OF COMPUTING SCIENCE PRINCIPAL LECTURERS/SENIOR LECTURERS LECTURERS IN COMPUTING SCIENCE

(Preference will be given to applicants with interest in one or more of the following areas: Management Information Systems, Computer Graphics, Computer Education in Secondary Schools, Computer Assisted Instruction, Systems Programming and application of computers in inventory control, production control, banking, insurance, hospital systems and all disciplines taught at the Polytechnic; e.g. Engineering, Mathematics, Textiles, Design and commercial subjects.)

General Qualification for appointment

Principal Lecturer: (a) a degree or professional qualifications; and
(b) an advanced specialist qualification or extensive experience in a specialized field; and
(c) substantial teaching and industrial/commercial experience; and
(d) proven administrative ability.

Senior Lecturer:

(a) A degree or professional qualifications, plus preferably an advanced specialist qualification; and
(b) at least five years professional experience; and
(c) substantial teaching and/or industrial/commercial experience (about 3 additional years); and
(d) proven administrative ability.

Lecturer:

(a) a degree or professional qualifications or at least a Higher Technician qualification in the appropriate field of study; and
(b) at least five years professional or industrial/commercial experience or at least three years teaching experience or a suitable combination of professional and teaching experience.

Salary Scales

Principal Lecturer: HK\$98,220 to HK\$121,200 p.a. by 5 increments
Senior Lecturer: HK\$79,980 to HK\$107,340 p.a. by 6 increments
Lecturer: HK\$44,220 to HK\$79,500 p.a. by 11 increments

Note: US\$1 = HK\$4.76 on 7th November 1978
(commencing salary will be commensurate with qualifications and experience)

Conditions of Service

Appointment will be on two-year gratuity-bearing contract terms initially. Thereafter suitable appointees may be offered further contracts or superannuable terms of service at the discretion of the Polytechnic. Benefits include long leave; free passages; subsidized accommodation; medical and dental treatment; children's education allowance; and a terminal gratuity equal to 25% of basic salary received over entire contract period.

Application forms and further information are obtainable from the General Secretary, Hong Kong Polytechnic, Hung Hom, Kowloon, Hong Kong. Completed application forms should be returned to the same office by 10th Jan 1979.



Data Base Specialist

An immediate opening exists for an IMS/VS data base specialist to work in an administrative group with IBM 3033 hardware. This position requires experience in data base management with IMS knowledge required. The individual should also have a BS degree in Mathematics or Computer Science with at least 3 years' experience.

This position is located in an eastern suburb of Pittsburgh, PA, in the most advanced, modern nuclear headquarters in the world, the Westinghouse Nuclear Center. To be considered for a challenging position that offers opportunity for advancement, competitive salary and liberal fringe benefits, please send your resume, including present salary, in complete confidence to Ms. Kathryn Trzeciesky.

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The University of Mississippi Medical Center is planning a significant expansion of its computer-based services in many applications areas. Patient accounting, patient care systems, financial accounting and educational support functions will all be expanded. A strong manager is required to coordinate and control Data Processing Operations.

The person we select will manage a three shift installation consisting of data entry, data control, remote job entry, systems programming and a complex teleprocessing network. We are presently a remote user of a central computer center consisting of an IBM 370/158 and a 370/155.

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The ideal candidate would have 5 or 6 years experience in the computer industry including two years in operations with supervisory responsibility.

Other factors we will consider are:

- Very strong interpersonal and communications skills are required
- In depth experience with OS or MVS, JCL, utilities (maybe experience as a systems programmer)
- MS or MBA preferred
- Knowledge of hardware, particularly terminals
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The starting salary will be commensurate with experience and qualifications and should be highly competitive with the market in Jackson, Mississippi. Please submit resume, including salary requirements to: Personnel Department, University of Mississippi Medical Center, 2500 North State Street, Jackson, Mississippi, 39216. An Equal Opportunity Employer, Male/Female.

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Position available for Systems Manager, Junior and Senior Programmer Analysts H/6000 installation using on-line program development, COBOL, and IDS.

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Mini- Computer Programmer

PDP 11/45 7/32, 8/32 DG NOVA SEL 32/55, HP 3000, Honeywell Level 6 H 716, Two years exp. Req. Suburban Virginia & Md. locations. U.S. Citizenship req. \$17-23K. Relocation pd. Rush resume: Cybermetrics Corp., P.O. Box 579, McLean, VA 22101 Tel (703) 356-1997. Other positions avail USA & OS.

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If you are seeking a challenging career in a growth oriented company and you meet these requirements send resume in confidence including salary requirements to Personnel Dept., Ohaus Scale Corporation, 29 Hanover Rd., Florham Park, New Jersey 07932. An equal opportunity employer, M/F.

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If you have a minimum of 2 years experience in systems programming with knowledge of MVS/JES1, ASM, communications, data base, capacity planning as performance evaluation we are interested in talking to you.

You will be involved in VS1-MVS conversion, hardware/software evaluation and planning. Performance measurement and evaluation. You will also act as consultant in providing technical support to USER groups.

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Dept. of Administration
Computer Services Div.
Mitchell Building
Helena, Mont. 59601
Attn: Dennis Sheline

An Equal Opportunity Employer

Assistant Director Of Computing Services

Excellent management opportunity with the West Virginia University Computing Services Department. Responsibilities include planning, organizing, and managing a central University Computing facility with administrative systems, operations, and academic computing functions. Bachelor's Degree with training in computer sciences, management, and related. Work experience and demonstrated capabilities in systems design, programming, and supervising. Project management experience in systems development, operations, and academic computing. Send resume of qualifications and salary information to: Jack Podeszwa, Personnel Officer, West Virginia University, Morgantown, WV, 26506. An Equal Opportunity/Affirmative Action Employer M/F.

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Leading Midwest based multi-billion dollar giant due to recent promotion seeks Mgr of Data Base Administration for latest state-of-the-art IMS environment. Client requires 4+ yrs related Data Base Administration exp w/min 1 yr as Mgr. Full career benefits, excellent career advancement. Client co pays all emp costs. For details contact J.K. Schwab at (704) 375-0600 or send resume in conf to:

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Memorex, the leading manufacturer of magnetic recording media and computer peripherals has an excellent opportunity for a Senior Systems Programmer.

You will program DEC PDP-11 in assembly language and Fortran to support the development and evaluation of disc drive products with sophisticated microprocessor based interfaces. You will also control and maintain PDP-11 systems software and microprocessor software development systems. Will also assist management in all phases of planning and design activities.

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Memorex offers excellent salaries, a complete company paid benefits package and outstanding growth opportunities.

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Department S

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You will be responsible for directing the activities of software personnel in the design and development of operating systems for a large, complex software system. Requirements would include a working knowledge of large scale IBM or compatible computer systems, proficiency in assembly and higher level programming languages and management experience with software systems personnel. A BS or MSEE, math or computer science is desired. Equivalent experience will be considered.

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Responsibilities will include the design, development and implementation of operating systems for use on complex software systems. Experience requirements include knowledge of assembly level and higher level languages, first level interrupt handlers, and queuing/dispatching related to IBM 370 systems architecture. Education preferred is a BS/MSEE, CS or equivalent experience.

STC offers a liberal salary plus benefits including health insurance, stock purchase plan and a retirement package.

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Maintain ACP realtime software; evaluate new support requirements/enhancements, develop modifications; minimum of 8 years, ACP internals; working knowledge of the following areas are required: 2305/3340 I/O handling, Tape I/O handling, Hypervisor, VMA support, Capture/Restore, Test vehicle support, System Initialization, and ACP generation.

For this position, prefer experience with ACP Release 8.1 and beyond; and IBM 370/168 hardware. Familiarity with SVS in a PARS support role is a plus; Bachelors degree in Mathematics, Computer Science, Engineering required.

Starting salary approximately \$2100 per month. If you are qualified for this position, and are seeking a competitive salary combined with excellent airline benefits, and suburban living, send your resume to:

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Individual will be responsible for all equipment including a DECsystem 1060 and supervision of hardware/software support personnel.

Masters degree or equivalent is required. Degree concentration should be in computing or computer-related disciplines i.e., business or mathematics. A minimum of 5-8 years of progressive responsibility including management and systems experience in a computer environment, strong interpersonal communication skill, ability to relate to both academic and administrative needs of college.

Salary is dependent upon qualifications and experience. Please send resume and present salary information by January 1, 1979 to:

**Bentley
College**

Beaver & Forest Sts.
Waltham, MA 02154/(617) 891-2000

Mr. Robert L. Lenington
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You will be responsible for our In-Depth section, which requires a weekly article of 3-5,000 words on an important current topic. Generally, you will secure these articles from outside experts, which requires that you work with senior staff editors to generate ideas, find people to execute them, evaluate unsolicited material and edit all material before publishing. Editing skills and the ability to work successfully with outside authors are more important than writing skills. You should have at least three years of journalism or editing experience, some knowledge of EDP and who's who in the business and the ability to work with artists to generate effective graphic material.

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MANAGER OF OPERATIONS - COMPUTING CENTER

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Qualifications: Demonstrated management and technical competence in the area of operations within a data processing center with 4-6 years experience in the operations area. At least two years as an Operations Manager or Assistant Operations Manager. A bachelor's degree desirable. Salary: \$15,800 to \$23,700 plus liberal employee benefits. Starting salary dependent upon experience and qualifications.

Interested persons should submit resume by December 21, 1978 to: Marc M. Solomon, Houck Computer Center, Oberlin College, Oberlin, Ohio, 44074. The position is to be filled by January 26, 1978 with the person reporting to work no later than March 1, 1979.

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We have an active Human Resource Management program stressing teamwork, adult functioning, problem solving, objective performance appraisal, and a healthy balance between goals and relationships.

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ASSISTANT DIRECTOR OF EDP STATE OF FLORIDA

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Employer Retained Agency Call or send resume to:

COMPU SEARCH
50 CALIFORNIA STREET, SUITE 3550
SAN FRANCISCO, CA 94111
(415) 362-0911

Product Planning Group Leader

THE POSITION

Staffing and organization of a Product Planning Modeling Lab. The purpose of the modeling lab will be to synthesize Functional Models (breadboards, prototypes) which will demonstrate the functional aspects of the end product. This department has been budgeted for 2-3 additional professionals.

This group will interact with the members of Product Planning in providing technical support in terms of components, peripherals, operating software, costs and schedules and also participate in scenarios and planning sessions to determine the future impact of new developments on the market place.

THE CANDIDATE

This position will require a BS in EE, Physics or Computer Science and at least two years of experience designing, constructing and testing of functional products using digital electronics and microprocessors. Supervisory experience will include a minimum of two years of supervising a group of professionals. The ideal candidate will have completed a project utilizing minicomputer or microprocessor development systems including hardware and software integration.

THE COMPANY

Monroe is a division of Litton Industries and is an international supplier of calculating and desk top computing equipment to the business market. The position would be in the World Headquarters in Morris, Plains, New Jersey.

We'll provide a commensurate salary and outstanding benefits as well as unusual potential for professional development and career growth. Send resume, including salary history to: Mr. Barry A. Depew.

 MONROE
Litton

Division of Litton Industries
The American Road
Morris Plains, NJ 07950
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VERSATEC, on the SAN FRANCISCO PENINSULA, the leading manufacturer of electrostatic printer/plotters, currently has a challenging opportunity in the unique area of graphic software development for a

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Program your future
with VERSATEC!

Initially, you will assume responsibility for developing graphic plotting software on mini-computer systems while gaining a broad knowledge of several popular mini-computer systems. 1-2 years previous FORTRAN and assembly language programming on Hewlett Packard 2100 computer system helpful.

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PROGRAMMER/ANALYST
Denver, Colorado

Industry leader has position open that offers ground floor opportunity in development of on-line, integrated general ledger, inventory, accounts payable and specialized management reporting systems using TOTAL DBMS on a PDP11.

Qualifications:

1. One year solid experience in applications programming under RSTS/E on PDP11.
2. College degree with major in business, math or computer science preferred.
3. Ability to work and communicate well with both EDP and user personnel.
4. Desire and ability to grow into DP management.

Special consideration for anyone with TOTAL experience. If you are interested in this rare opportunity, send your resume to:

MIS Director
Agriventure Corporation
P.O. Box 16345
Denver, Colorado 80216

DEC - 20

Progressive midtown Manhattan based Software Systems Firm seeks qualified individuals interested in promising career enhancement. We currently have openings for the following:

* Systems Programmer * Will have total responsibility for all system software. Must have DEC 20 or DEC 10 experience.

* Operators * Any DEC or timesharing experience. Will train.

* Send resume and salary history to:

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Business Information
Systems, Inc.
747 Third Avenue
New York, N.Y. 10017

**MANAGER - DATA PROCESSING COMPANY. Meet with representatives of Brazilian organizations located in the United States to develop computer systems specifications and proposals. Supervise development of programs and implementation of systems. Must speak Portuguese. Three years experience in programming management or systems analysis and references required. 9:00 a.m. to 5:00 p.m., Monday through Friday, \$25,000 per year. Apply International Computer Services, Inc., 4708 Wisconsin Avenue, N.W., Suite 200, Washington, D.C."

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ENGINEERS**

THE POSITION: We will be opening our new computer refurbishing center soon in a desirable Minneapolis suburb, and need a person to configure, test and stage IBM GSD computer equipment (primarily system/3) prior to delivery. Some installation in the field is required. Excellent salary, complete benefits including moving expenses.

THE QUALIFICATIONS: The ideal candidate will be technically knowledgeable of the IBM GSD products, primarily System/3. Experience from either IBM or a 3rd party maintenance firm is acceptable. We need a career minded, self starting individual with a problem solving attitude.

THE COMPANY: Data 3 Computer Corporation is a leader in the purchase, sale and leasing of IBM GSD products. The new computer refurbishing center will enable us to maintain rapid growth in this dynamic industry. For information and an appointment, call Bob Johnson Collect. ALL INQUIRIES WILL BE HELD IN STRICT CONFIDENCE.

DATA 3 COMPUTER CORPORATION

P.O. Box 266

(612) 682-4884 Buffalo, MN 55313

PROGRAMMER/ANALYSTS

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Call this number and ask for our Staffing Department. You'll receive information on the company that is working in support of such projects as Mission Support, Science and Applications, and Goddard Real-Time Systems at the NASA Goddard Space Flight Center.

And we'll also tell you about our Maryland suburban location just outside of Washington, D.C.

If you have a Bachelor's or advanced degree in Computer Science, Mathematics, Physics, Astronomy or Engineering; a background in large-scale or mini-computers; and a genuine desire to advance in your career: you owe it to yourself to call today.

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CORPORATION**

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System Sciences Division
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FLORIDA**

Red Lobster Inns, the nation's largest full service seafood restaurant chain, has an immediate opening in our 370/148 VM/CMS shop for a programmer analyst.

WE OFFER:

- * Excellent salary and benefits
- * Profit sharing
- * Orlando Florida location
- * Paid relocation

We are seeking a data processing professional with a minimum of 4 years' experience in COBOL programming. Additional prerequisites include exposure to systems design and project leadership in a 370 environment.

If you qualify send your resume with salary history to: Dept. RBG, Red Lobster Inns of America, Inc., P.O. Box 13330, Orlando, Florida 32859.

Red Lobster

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Affirmative Action Employer M/F

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SYSTEMS ANALYST

Armour Dial has immediate opportunity for an individual with approximately 2-4 years programming experience in a real time, multi-programming environment. This new position is an integral part of a state-of-the-art data acquisition, control, and management information system being installed in our food operation. A computer degree is desirable but proven experience is the key.

Responsibilities will include real-time operating systems enhancement and maintenance, systems analysis and software systems consultant to members of the computer systems department. Some application programming in Fortran and/or assembly language may also be required.

This position located in the pleasant river community of Ft. Madison, Iowa offers challenge, visibility and the opportunity to work with a team of aggressive professionals. You are invited to submit a resume and salary requirements specifying hardware and software experience in assured confidence to:

Employee Relations Supervisor

ARMOUR DIAL COMPANY

P.O. Box 1427
Ft. Madison, IA 52627

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DATA BASE ADMINISTRATION Honeywell 6600

Commitments to comprehensive computer systems development utilizing Honeywell's DMIV software have created a need for additional data base specialists within the Corporate Data Base Administration department of a leading Management Service Organization.

DATA BASE ADMINISTRATOR - Requires previous experience as either a DEA or DBMS software support specialist, including at least 3 years of IDS and TDS responsibility. Some travel required. Responsible for physical design, implementation, and support of totally integrated, corporate-wide data base utilizing DMIV.

APPLICATION SUPPORT ANALYST - A strong application programming background with a minimum of 3 years experience utilizing IDS and TDS is required. Will act as technical consultant to the Systems and Programming department.

Initial assignments (long term) will be with our Wilton, Connecticut based Relocation Management subsidiary. Full DMIV training will be provided. Offer includes competitive salary, liberal benefits, a comprehensive relocation package and a professional working environment with excellent career opportunities. Qualified applicants are invited to send resume, in confidence to:

Patricia H. Adelhardt

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Expansion of the Washington, D.C. management consulting practice of Arthur Young & Company has created several opportunities for bright, aggressive individuals with 1-5 years experience in data management. We are seeking to expand our core of professionals skilled in one or more of the following areas:

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- DATA STANDARDIZATION
- DBMS EVALUATION & SELECTION
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- DATA BASE DESIGN (especially S-2000)

Arthur Young & Company is an international "Big-8" public accounting and management consulting firm. Our Washington office consulting clients include federal, state, and local governments as well as commercial organizations with applications in financial and accounting systems, decision support systems, and data resource management, among others.

These positions are career openings with excellent opportunities for rapid advancement and professional development. Starting salaries are commensurate with education and experience. An advanced technical degree or management degree with an information systems specialization is required. Please submit resume and current salary in confidence to:

Dr. Craig M. Cook

ARTHUR YOUNG & COMPANY
1025 Connecticut Ave., N.W.
Washington, D.C. 20036

An Equal Opportunity Employer M/F

ARTHUR YOUNG

PROGRAMMER/ANALYST

Corning Community College is now accepting applications for the position of Programmer/Analyst in its computer center. Duties require experience in DOS, Power, Cobol, RPG and Fortran. Minimum requirements: Associates Degree in Business Data Processing with one year actual programming experience or minimum of three years actual programming experience. Interested candidates should submit a detailed resume with salary requirements to:

Director of Personnel
Corning Community College
Corning, New York 14830

Deadline for filing applications is December 11, 1978.

Corning Community College is an Equal Opportunity/Affirmative Action Employer, adheres to the guidelines of Title IX, and does not discriminate against handicapped.

COMPUTING CONSULTANT

Mississippi State University invites applications for the position of computing consultant in the Department of Computer Science. Responsibilities of the position include assisting university faculty and staff with various computing and programming projects. Applicants should have experience and/or training in computing and should have an ability to work with others. A bachelor's degree is required, but a master's degree is preferred. Applicants should forward a resume and a list of references to:

Prof. Gerald A. Matthews
Cdrtr of Computing Services
Dept. of Computer Science
Mississippi State Univ.
P.O. Drawer CS
Mississippi State, MS 39762

Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age or handicap.

DATA PROCESSING OPPORTUNITIES

Progressive, dynamic, credit insurance company looking for programmer analyst capable of management opportunities. Educational and/or work experience in finance, accounting/management areas of value. Finest fringe package available. Salary open.

Send a detailed resume and salary history to P.O. Box 300, Southfield, Michigan 48037, Attn: Robert Cahill

COMPUTER PROGRAMMER Wanted

To work with the academic activities of a college computer center. Position involves programming and consulting in a variety of computer languages. Salary \$14,000-17,500 (based on qualifications) with one month vacation and State benefits. Minimum requirement of a Bachelor's degree (or equivalent) and significant computer experience. Apply before December 22, 1978 with resume to: Dr. Lee T. Bryant, Computer Center, State University College, Geneseo, NY 14454. An Affirmative Action/Equal Opportunity Employer.

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Banking applications experience needed now!! Assembly Language/COBOL. Programmers - Programmer/Analysts - Analysts - Project Leaders - Manager of Systems and Programming. Salaries from \$15,000 to \$37,000. Call Jim Fleming at (713) 961-3271 or send your resume to:

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Houston, TX 77056

Information Systems Analyst

INFORMATION SYSTEMS ANALYST responsible for developing an integrated university-wide student system. Candidates must have the ability to communicate with a diverse group of administrative users and be able to specify system requirements to the administrative computing department. Minimum requirements include a bachelor's degree and experience in systems analysis and design. Salary: \$15,000-\$17,000. Send Resumes to: Dr. Frank Bittel, Acting Provost, Office of the Provost, Tulane University, New Orleans, Louisiana 70118, by January 31, 1979. Affirmative Action/Equal Opportunity Employer

Data Processing

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We offer competitive salaries, excellent benefits, and diversified, challenging positions with recognition and reward for potential and performance.

For confidential consideration, send resume (including salary history) to: KAMAN SCIENCES CORPORATION, Attn: RS, P.O. Box 7463, Colorado Springs, Colorado 80833.

KAMAN SCIENCES CORPORATION
ATTN: FL
P.O. Box 7463
Colorado Springs, CO 80933

KAMAN SCIENCES CORPORATION
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For You In Building A Better
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Sperry Univac has a variety of challenging opportunities waiting for you at one of our Minneapolis locations. These openings exist within our Airline Industry Development Center which designs and supports software applications such as reservations, ticketing, cargo, departure control, message switching, check-in, hotel and fare quote. We are searching for candidates with 2+ years experience in ANY of the following disciplines:

- * Design, implementation and support of real time applications
- * Acceptance testing of application programs,
- * Technical support in the customer environment
- * Specific support of OS 1100/TIP/CMS

In addition to requiring experience within the areas mentioned above, it is also desirable to have a background in FORTRAN, and/or general UNIVAC 1100 series exposure.

We offer highly competitive starting salary, a comprehensive benefits program and outstanding professional and personal growth opportunities.

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(612) 456-2309

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PROGRAMMER/ANALYST

We are a large, rapidly expanding food processing company located in Seattle, Washington with an opening for an experienced Programmer/Analyst. We are looking for an individual with accounting, order entry and inventory control background. This person will assume responsibility for maintaining and enhancing current systems on a Datapoint 5500. The ability to document systems is a plus.

Our company offers good job security, competitive salary and company-paid benefits. Company pays relocation expenses. If interested, please send your confidential resume with salary history and requirements to Pacific Pearl Seafoods, 1450 - 114th Ave. S.E., Bellevue, WA 98004. An Equal Opportunity Employer.

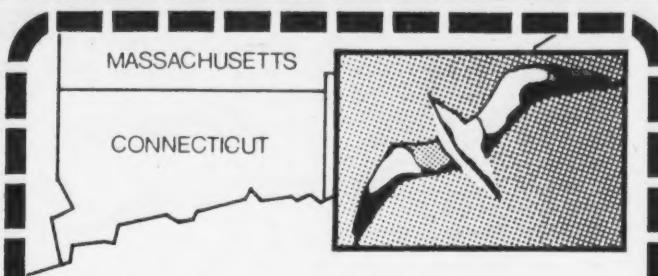
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OPPORTUNITIES FOR COMPUTER PROFESSIONALS IN BUSINESS COMPUTER APPLICATIONS: ANALYST PROGRAMMERS

We have openings for experienced individuals who have a proven track record in large applications systems using advanced IBM 370 hardware and software technology. If you desire to help us ready for the 1980's, if you produce quality systems on time, within budget, within specifications, you may like the challenges.

Please apply in writing with educational, employment and salary requirements to:

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The Wisconsin Department of Transportation is seeking a professional who will actively solicit and develop new, innovative, and expanding ways to provide data communication support and teleprocessing network analysis.

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Salary from \$1,570 to \$2,135 per month, depending on qualifications. Position requires knowledge of teleprocessing, data base, and conventional systems, including hardware and software capabilities and limitations.

For more information and a special application form, contact or call John Sailing by December 20, 1978 at:

WISCONSIN DEPT.
OF TRANSPORTATION
P.O. Box 7915 — Personnel
Madison, WI. 53707
(608) 266-0436

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The communications projects you'll work on and the products you'll design will lead to direct involvement with 1980's concepts, and with state-of-the-art development in:

■ Bit-Oriented Link Protocols	■ Internodal Routing Algorithms
■ Packet Switching	■ Network Supervision
■ End-to-end Protocols	■ Distributed Processing

The key professionals we're seeking for our expanding, and strongly software-oriented communications group will have had solid backgrounds in communications and/or systems software. More specifically, we require 3 or more years of experience in one of the following: Assembly Level Programming; Operating System Design; Communications Link Drivers (asynch, synch, SDLC); Front End Processor Software; Terminal Controller Software; Data Network Design.

For a high-level review of your qualifications, and a prompt briefing on the exceptional career opportunities and lifestyle you can enjoy at NCR/Columbia, call Mr. Kenneth Uhlig, toll free: 1-800-845-0586. Or send your resume and salary history to him at: NCR Corporation, Engineering & Manufacturing, Department S50, 3325 Platt Spring Road, West Columbia, South Carolina 29169.

NCR

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<p>INFORMATION SYSTEMS PLANNER</p> <p>A Fortune 200 manufacturing corporation seeks a qualified individual to contribute in a senior staff capacity to the improvement of corporate wide information systems plans and methodologies for computer application development and EDP hardware/software and related telecommunications use.</p> <p>The person selected should have previous experience in the use of structured analysis/programming techniques, and be capable and interested in guiding their introduction and use. First-hand involvement in EDP technical training, standards development, or hardware evaluation is a definite asset.</p> <p>The position is headquartered in southern Connecticut in a firm which offers competitive salaries and excellent benefits.</p> <p>Reply in confidence with resume and salary history to:</p> <p>CW Box 128 Room 305, 400 Madison Ave. New York, N.Y. 10017 An Equal Opportunity Employer M/F</p>	<p>PROGRAMMER/ANALYST</p> <p>Applications are being accepted by the Fairfield-Suisun Unified School District for Programmer/Analyst. Applicants must have experience in COBOL in a time-sharing environment. DEC Experience valuable. Contact the Personnel Office, 1025 Delaware Street, Fairfield, CA. 94533 (707) 422-3200, Ext. 36. Applications will be accepted thru Wed. Dec. 27, 1978.</p>	<p>PROGRAMMER/ANALYST</p> <p>City of Roanoke, Virginia</p> <p>Performs complex work in development, design and preparation of computer programs under the general supervision of the Systems and Programming Supervisor.</p> <p>Must have education and experience equivalent to graduation from an accredited college or university with major work in Computer Science and considerable experience in Computer Programming. Cobol experience required.</p> <p>Salary: \$15,431.00 - \$19,734.00. Send resume to: C.N. Patterson, Jr., Dept. of Personnel Management, Room 207-A Courthouse, 210 Campbell Ave., S.W., Roanoke, Va. 24011.</p>	<p>TWA SYSTEMS SUPPORT</p> <p>Challenging opportunities exist for Systems Programmers in the following areas:</p> <p>PARS FILE SUPPORT</p> <p>Perform file reorganizations database conversions; enhance/maintain file support programs; working knowledge of the PARS file support programs, database organization, and 3340 based storage systems.</p> <p>PARS TEST VEHICLE SUPPORT</p> <p>Perform test systems generation, enhance/maintain test vehicle programs and test tool programs; working knowledge of PTV, realtime trace facilities.</p> <p>ACP SYSTEMS SUPPORT</p> <p>Maintain ACP realtime software, evaluate new support requirement/enhancements, develop modifications; working knowledge of internals of ACP release 8.1 and beyond to include 3340 and Hypervisor support.</p> <p>PARS COMMUNICATION SOFTWARE SUPPORT</p> <p>Enhance/maintain CCP, CCP support programs, 3705 EP, Network Control programs, PARS Message Switching programs; familiarity with communications data base structure; working knowledge of airlines line control, BSC and IATA line controls.</p> <p>MVS/JES3 SYSTEM SUPPORT</p> <p>Perform system measurement/tuning using GTF, RMF, SMF and/or other tools; Perform system generations enhancements, maintenance and provide local user support; Must be familiar with COBOL, FORTRAN and/or PL/1 language in a virtual system environment.</p> <p>MVS/JES3 ONLINE SYSTEM SUPPORT</p> <p>Must have working knowledge of one or more of IBM telecommunication subsystems - NCP, VTAM, TCAM, IMS; Perform system maintenance, tuning, enhancements, and provide DBA/application support using COBOL, FORTRAN and/or PL/1 languages.</p> <p>VM SYSTEM SUPPORT</p> <p>Perform system generations and maintenance of the VM operating system; develop and maintain enhancements to support local user needs.</p> <p>REMOTE SOFTWARE SUPPORT</p> <p>Generate, maintain, enhance intelligent terminal software; familiarity with INCOTERM 20/20 and 10/25, RDS PTS/100 and 500 programs; knowledge of remote load capabilities.</p> <p>All positions require 360/370 assembler language, IBM 370 hardware experience, and a minimum of two years systems programming experience; college degree is preferred.</p> <p>If you are qualified for these areas, and are seeking a competitive salary combined with excellent airline benefits and suburban living send your resume with salary history to:</p> <p>Mr. C.J. Flood Director-Systems Support TWA Administrative Center 11500 Ambassador Drive Kansas City, Missouri 64195</p>	<p>MGR DATA PROCESSING TO \$35,000 + BENEFITS</p> <p>Our client, a well-recognized, expanding Mid-Atlantic technical services firm, seeks an experienced manager to direct its computer center. The successful candidate will have a strong ability to manage a minicomputer installation, to convert user requests into operational systems, and to provide technical guidance. Background should include a degree with 5-10 years in a technical or service environment. Knowledge of Fortran, RPG II and COBOL would be an asset. All employment costs, including our fee, are paid by the client. Please respond in strictest confidence by resume or phone to Bob Mansfield at (201) 947-6920.</p> <p>FOX-MORRIS Personnel Consultants 2125 Center Avenue Mt. Lee, N.J. 07024</p> <p>Programmer/Analyst</p> <p>Minimum 3 years EDP systems and programming experience in the manufacturing industry. Must be proficient with COBOL and thoroughly familiar with IBM 370 systems using OS/VS2 SVS and HASP. Requires a minimum of 2 years systems design and analysis experience. An excellent opportunity with a rapidly growing company with the EDP staff located at corporate headquarters.</p> <p>Salary range: 16K to 22K, plus excellent benefits package which includes 100% company paid medical, dental, life and accident insurance for you and your eligible dependents.</p> <p>To apply, send resume in confidence to Employment Supervisor:</p> <p>Gates Learjet P.O. Box 7707 Wichita, Kansas 67277 An equal opportunity employer M/F.</p> <p>TELEPROCESSING ANALYST 1841-2290</p> <p>Requires 2 years college and 4 years responsible experience using COBOL including 2 years as a Systems Software Specialist responsible for teleprocessing software and/or hardware.</p> <p>PROGRAMMER ANALYST 1327-1650</p> <p>Requires High School graduation and 1 year experience in design, development and implementation of business computer programs using COBOL.</p> <p>PROGRAMMER ANALYST II 1584-1971</p> <p>Requires High School graduation and 2 years experience as above.</p> <p>PROG ANALYST III 1719-2139</p> <p>Requires 2 years college and 2 years experience as above plus 1 year at supervisory or lead capacity.</p> <p>Official applications must be on file. Apply immediately.</p> <p>OFFICE OF THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS 9300 E. Imperial Highway Downey, CA 90242 (213) 922-6311 We are an Equal Opportunity Affirmative Action Employer</p> <p>SCOTT & WHITE MEM. HOSPITAL 2401 S. 31st St. Temple, TX 76501 817-774-2527 (CALL COLLECT) EOE</p> <p>DIRECTOR OF MANAGEMENT SYSTEMS INDIANA UNIV (Reopened)</p> <p>Originally advertised June 19, 1978, MS/MBA no longer required. Apply by December 22. An Affirmative Action/Equal Opportunity Employer.</p> <p>SYSTEMS APPLICATIONS PROGRAMMERS</p> <p>IBM/370 installation with DOS/VS, CICS, SPM and EASY-TRIVE. Several on-line financial and manufacturing applications and growing. Several openings for programmers for entry level as well as senior positions. Send resume or call:</p> <p>Natu Patel Director, Management Systems ASG Industries Inc. P.O. Box 929 Kingsport, Tenn 37662 1-800/251-0441</p> <p>EXECUTIVE DIRECTOR COMPUTING NETWORK FOR HIGHER EDUCATION AND RESEARCH</p> <p>EDUNET is a new national network established to facilitate sharing of computing resources among colleges and universities. It grew out of a major five-year development project in which 23 leading universities participated. EDUNET is formed within EDUCOM, a non-profit membership organization serving higher education since 1964.</p> <p>The Executive Director will have full responsibility for developing and executing a financial and operational plan for disseminating information about computing products available through EDUNET. The person selected must have a record of outstanding accomplishments in technology-related activities, and show clear evidence of managerial as well as technical competence. Candidates must have substantial experience showing continued professional growth; experience in higher education and an advanced degree would be very desirable. Salary is open and consistent with the demanding qualifications of the position.</p> <p>EDUCOM is an equal opportunity employer. Send resume to President, EDUCOM, P.O. Box 364, Princeton, N.J. 08540.</p>

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Technical Support Analyst

We're searching for a hands-on professional who has 2-5 years experience with Univac Series 90, utilizing ICAM and IMS 90 software (Univac VS/9 experience acceptable). The ideal candidate will have an indepth knowledge of data communications, with experience in hardware/software evaluation and selection. Excellent oral and written communication skills are essential.

Individuals with IBM - DOS - OS and assembly language experience will be considered. Degree required.

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INDIANA UNIVERSITY DIRECTOR OF MANAGEMENT SYSTEMS

Indiana University invites applications and nominations for the newly created position of Director of Management Systems. The Director will report to the University Director of Information and Computer Services.

The Director of Management Systems is responsible for the design, development, implementation, maintenance, and evaluation of new, or significantly revised, management information systems throughout Indiana University. Related management responsibilities include customer and internal training plans and programs and the development of internal management systems and procedures. The Director will supervise 38 full-time positions. The primary computer supporting these systems is an IBM 370/158-3AP with 5 megabytes of memory. Software includes MVS, CICS, MARK IV, and SYSTEM 2000.

Qualifications:

Training and experience in information systems design, management of computing applications, data base technology, ten years of progressively successful management experience in a large scale organizational and/or project management situation, preferably within a university environment. Five years of successful management experience in a position directly responsible for the development and implementation of management information systems, within a university environment. Superior written and verbal communication skills. Management and financial expertise.

Desirable Characteristics:

Manager or associate in such university functions as registrar, admissions, financial aids, student services, university planning, budget management, faculty records, personnel, accounting.

Appointment:

Twelve month, liberal fringe benefits, this position is open and available.

Salary: Open, depending upon background and experience.

Effective Date:

Mutually agreed to, but wish to appoint effective September 1, 1978, or earlier if possible.

Closing Date for Receipt of Application: December 22, 1978.

Contact: Thomas W. West, Selection Advisory Committee
Bryan Hall, Room 7, Indiana University, Bloomington,
Indiana 47401. Phone (812) 337-1053

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SYSTEMS PROGRAMMERS

Here is your chance to take advantage of a full range of exciting opportunities that currently exist at the First National Bank of Boston for experienced IBM OS/VS Systems Programmers and Assembler Programmers. While providing quality systems software support to our Data Center and User community, you will be working with MVS 3.7, JES2, making extensive use of TSO on IBM 3032, 3350, and 3800 hardware.

The individuals we are seeking should have several years of OS and BAL experience and the ability to develop and present creative solutions to technical problems. On-line experience would be a plus, as we are consolidating our 3 major networks using the INTERCOM teleprocessing monitor.

The First National Bank of Boston offers a flexible working environment combined with an excellent salary and benefits to provide you with considerable latitude for personal and professional growth. If you are interested in utilizing your skills with a challenging and rewarding environment of one of the leading financial institutions in the Boston area, please forward your resume, including salary history, in confidence, to J.S. Allschwang, The First National Bank of Boston, P.O. Box 1976, Boston, MA 02105.

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INFONAMICS, INC.
Suite 228
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Hinsdale, Ill. 60521
or call (312) 325-7660
or wire TELX 20-6285

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- Sr. Programmer Analyst
- Applications Programr

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SALEM STATE COLLEGE PROGRAMMER

Staff Assistant/Computer Programmer to work in a time sharing environment (CDC CYBER 72/NOS) assisting with development of an on-line Fiscal Management System, Student Information System, and in support of other Administrative and Academic DP needs.

REQUIRED: 3-5 years COBOL experience in management systems with good oral and written communication skills.

DESIRED: Bachelor's Degree; familiarity with SPSS, FORTRAN, TOTAL, Financial Accounting, on-line DBMS, and CDC hardware/operating systems.

SALARY RANGE: \$12,935 - \$18,350 + excellent benefits

APPLY TO: Screening Committee
c/o Affirmative Action Office,
Salem State College,
Salem, MA 01970

DEADLINE: Applications must be received by January 8, 1979.

SSC is an Equal Opportunity-Affirmative Action Employer and is in compliance with Title IX of the Federal Laws.

Programmer

We are seeking a qualified programmer who has demonstrated a proven background in COBOL programming, preferably with IBM 360's or 370's. Minimum of 1-2 years' experience needed. To work in medium-sized installation with IBM 370/138, DOS/VS. This is an opportunity to write and maintain programs in COBOL as well as perform systems-type duties. Competitive salary and excellent employee benefits. Send resume with salary history and requirements to: Personnel Department, Wilmington Medical Center, 501 West 14th Street, Wilmington, DE 19899. (302) 428-2774. An Equal Opportunity Employer.

systems representative

An industry leader in minicomputers has an immediate opening for a Systems Representative in its BALTIMORE OFFICE. Major responsibilities include pre- and post- sales support, customer installation, project management, and technical assistance.

The position requires 2-3 years' experience with small on-line business computer systems, a solid understanding of accounting principles, project management, programming (BASIC preferred), and systems design. Excellent oral and written communication skills are essential. Degree is preferred.

We offer an excellent starting salary with full company benefits as well as career potential. If interested, please send resume complete with salary history in confidence to:

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corporation** 
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If who you work for and where you work are important, we have exciting opportunities for you.

Our ever increasing business has created new marketing positions in both our Denver and Colorado Springs offices. We are looking for candidates with experience in marketing data processing services or with banking, medical clinics, or general business experience and an interest in marketing.

We offer competitive compensation, excellent benefits and challenging positions with recognition and reward for individual contributions.

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P.O. Box 7463
Colorado Springs, CO 80933

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K CORPORATION**

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Major forest products company has a challenging opportunity in its San Francisco Headquarters Office for an individual with experience in development and implementation of program for a large diversified computer environment.

A position offering career growth with the company provides for exposure and interface with various levels of management. Ideal background would include College degree or equivalent, 7-10 years data processing experience, 3-5 years supervisory experience and 2-3 years audit/disaster recovery planning experience.

Excellent salary and benefits package. Please send resume and salary requirements to Bess Jones, Professional Employment, Room 802M, CROWN ZELLERBACH, One Bush Street, San Francisco, CA 94119. An equal opportunity employer M/F.

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MARK IV PROGRAMMERS AND ANALYSTS

SRZ SOFTWARE SERVICES, the largest MARK IV consulting company in the USA, has openings for experienced programmers and analysts skilled in design and development of MARK IV systems:

Positions are currently available in:

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SRZ Software Services, Inc.
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Software Development Programmers

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Openings at all levels for qualified programmers and analysts who have the capabilities for developing sophisticated, state-of-the-art software. Assembly language experience essential.

Experience with on-line systems (CICS, ROSCOE, TSO, etc.) or knowledge of DOS or OS internals is a definite plus. If you have participated in the development of any type of software packages—system, utility, or application—we would really like to talk to you.

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Please send your resume in complete confidence, including current salary and position desired, to: Director, Software Products Division. Or call 609-921-8550

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5 years ago, we developed a serial tasking operating system for the industry's first 32-bit mini. We currently offer a multi-tasking operating system that can support scientific, simulation and transaction processing environments concurrently. This same OS offers an interactive program development environment.

If you seek the ultimate in technical challenge and operating systems is your specialty, join us as we continue to exploit our current and future hardware capabilities.

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Our commitment over the years to make continuing improvements in our software is evident with the recent introduction of our FORTRAN VII system. Our globally optimizing compiler is the finest ever developed. Fast execution time, comprehensive error analysis, and fast and simple program compilation added to our 32-bit architecture equates to technical sophistication we're proud to be responsible for. If you would like to participate in ongoing development with our group of specialists responsible for the industry leading FORTRAN VII compiler, and have strong knowledge of compiler techniques, FORTRAN, and assembly language programming, we'd like to hear from you.

The above positions require a minimum of a Bachelor's Degree, with advanced degrees preferred. We offer excellent benefits and unlimited growth opportunities. For prompt consideration, call collect (201) 747-7300, or send resume including salary history to: Mr. William C. Beattie, Jr., PERKIN-ELMER, Interdata Division, 106 Apple Street, Tinton Falls, New Jersey 07724.

PERKIN-ELMER

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ENGINEERING

DATA COMMUNICATIONS PROFESSIONALS

The Telecommunications Engineering Division of Siemens Corporation in Cherry Hill currently has the following opportunities for highly motivated individuals who desire to begin or expand their career in the field of Text and Data Systems Development.

Positions are available at all levels of experience in the following areas:

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- Real Time Programming
- Operating Systems
- Diagnostics
- Man-Machine Programs

SYSTEMS ENGINEERING

- Definition
- Architecture
- Validation
- Networking
- Project Leaders

HARDWARE ENGINEERING

- Logic Design
- Microprocessors
- Mechanical Packaging

Previous experience with message, packet or circuit switching is a definite attribute for all positions.

Siemens, an international leader in electronics offers a comprehensive company paid benefits program including dental plan and life insurance, and provides an excellent work environment.

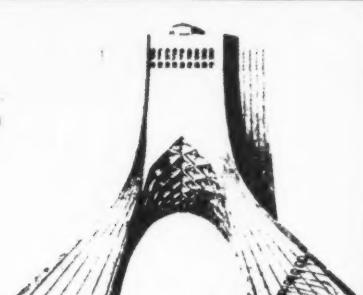
Please send a resume, including salary requirements to: Personnel Manager, Telecommunications Engineering Division, Siemens Corporation, 18 Olney Avenue, Cherry Hill, NJ 08034. An Equal Opportunity Employer, M/F.

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Seeking H-6000/ Level 66 Programmers, Analysts, Applications Programmers, Data Base Specialists, Systems Analysts, Communications Programmers, Level 6 Mini Programmers, Systems Programmers, Systems Engineers with exp. on H-6000/Level 66, GE 635 with GCOS, COBOL, GMAP, and/or IDS, WWMCCS, TSS exp. TDS, TPE MDOS exp. is great but not req.

You will develop advanced information systems in Tehran in a modern American environment. Work with the best Honeywell Systems Pro's in the field. And you will be earning, learning and seeing the world. Your personal income package will meet or exceed \$50,000 Family housing provided free. USA per year, tax free of US or foreign taxes, with excellent fringes & benefits (family tours, too).

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Call (703) 356-1997 till 10PM, Mon.-Fri.

ANALYST

This position will work closely with data system users to develop specifications for data systems to support the administrative functions of the Institute; is responsible for the total project life cycle which includes forms and file design, program specification and support, system testing, user training and documentation. The first major effort will be the successful implementation of a Alumni/Development records system. A minimum of 3-5 years of data processing experience, a B.S. degree in Computer Science or equivalent experience/training, at least two years in COBOL experience and excellent oral and written communication skills. Highly desirable attributes include: data base experience with TOTAL, on-line application experience, knowledge of MARK-IV, large mainframe (360/370) experience and higher education system in the Financial and Alumni Records applications. We offer an excellent salary and a liberal fringe benefit package. If you're interested send a resume including salary history and requirements in confidence to: Manager of Recruitment, RPI, Pittsburgh Building, Troy, NY 12181.

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If you have hardware or software experience in any of the following areas . . .

- * Microprocessor based systems development
- * Data communications
- * Digital signal processing
- * Digital systems design
- * Operating systems
- * RSX 11M systems
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- * Real-time software
- * Operating systems development

. . . we can offer you the opportunities to expand your professional horizons. We have in-house custom LSI development capabilities and unbounded opportunities for all levels of engineering and software development people. For immediate and confidential consideration call Rod Manning collect at (305) 592-5996, Monday through Friday, 9 a.m.-4 p.m. or

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RACAL

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IMS Internals Project Manager

To 36K—Florida

Our Florida client is seeking an IMS Internals Expert who is currently a manager or who has management potential. This position requires 6 years in Data Processing with 4 years IMS internals design, working with productivity aids, standards and procedures, performance timing and data base recovery techniques. Relocation expenses paid and an excellent benefit package is included.

We are consultants to management. For immediate and confidential consideration, please send resume and salary history to: Gary R. Schultz, One Maritime Plaza—Suite 1350, San Francisco, California 94111. (415) 956-7120. Employer assumes fee.

professionals for computing, Inc.

Systems Programmer

Battelle, one of the world leaders in research and development, has an immediate opening for a Systems Programmer who is looking for a broad range of opportunities. Experience in CDC, DEC, or large-scale IBM systems is preferred. You should possess excellent technical and communication skills.

The Battelle Computer Center supplies computing resources to support a large variety of research, development, and educational activities. We provide telecommunications capabilities on a worldwide basis, linked to two large CDC computers and a VAX 11/780. You will have the opportunity to participate directly in many interesting research and development projects involving computer technology. Salary will vary from \$18,000 to \$26,500 commensurate with experience and capability. Send resume in confidence to:

Dick Shaw, Personnel Advisor

Battelle

Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

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DIRECTOR, WHARTON COMPUTER CENTER

The Wharton School of the University of Pennsylvania is seeking an individual to manage its computer center. The individual will be responsible for:

managing the overall operation of a medium-scale academic computing facility serving 2000 students and 200 faculty/administrative users
directing a staff of five full-time and fifteen part-time employees
interacting with a broad spectrum of computer users, including students, faculty, administrators and others
exercising fiscal control of the centralized school computer budget
teaching and administering an introductory MBA-level computer course

The individual should have experience in managing a service organization and have solid understanding of the principles of interactive computer operation and hardware. Knowledge of several major computer languages is essential, preferably APL, FORTRAN and/or COBOL. Specific experience with DEC-10 computers is desirable. Applicants should possess an MBA, or other advanced degree, or comparable job experience.

Resumes and related material should be sent to:

Director Search Committee
Wharton Computer Center
The Wharton School
University of Pennsylvania
E-108 Dietrich Hall CC
Philadelphia, PA 19104

Attn. Mrs. Jacqueline M. Schreyer

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Mark Fuller

CADILLAC ASSOCIATES, INC.

32 W. Randolph St.
Chicago, IL 60601
(312) 346-9400

INST. OF DATA PROCESSING

Applicants must hold a bachelor's degree, master's preferred; be able to provide evidence of teaching ability and have at least two years experience in COBOL with exposure to Assembler and/or RPG. FORTRAN also helpful as well as some experience in systems development. Academic year contract. Full-time beginning January 16, 1979. Salary commensurate with education and experience. Application deadline - postmarked no later than December 15, 1978.

Send resume and credentials to:
Personnel Office, Parkland College, 2400 W. Bradley Avenue, Champaign, IL 61820.

AA/EEO Sec. 504 Employer

COMPUTER PERSONNEL

Sedgwick County has installed an IBM 370/178 computer system and are in the process of staffing qualified computer personnel in the area of OS/VS1, CICS, DL1, COBOL and a number of applications such as Accounting, Payroll, Personnel, and Justice Information Systems.

Any persons interested in participating in the development of this new computer center should send resumes with salary requirements, or contact the following:

Ted E. Jones,
Director of Data Processing
510 North Main
Wichita, Kansas 67203
Phone: 316-268-7968
or

Michael A. Mueller
Sedgwick County Personnel
510 North Main
Wichita, Kansas 67203
Phone: 316-268-7178

CAREER OPPORTUNITIES IN DATA PROCESSING IN A UNIV. ENVIRONMENT
SYSTEMS ANALYST
COMPUTER PROGRAMMER
COMPUTER PROG/ANALYST
FOR THE UNIVERSITY OF TENNESSEE, KNOXVILLE

Experience needed in system design, documentation and programming for on-line administrative systems. Skill in structured system design, modular COBOL programming, OS/VS JCL, IMS DB/DC and PANVALET preferred.

Submit your resume to University of Tennessee Employment Center, 1818 Terrace Avenue, Knoxville, Tennessee 37916

UTK is an EEO/AA
Title IX Sect. 504 Employer

TELECOMMUNICATIONS ANALYST

Major data processor for credit unions has an opening for a Telecommunications Analyst. This position involves financial administration, analysis and optimization of lease line networks and terminal equipment. 2-5 years experience is required and a degree is desirable but not necessary. Salary will be commensurate with experience.

Send resume including salary history and requirements to: Personnel Officer, CUNADIA Corporation, 6902 Odana Road, Madison, Wisconsin 53719.

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DATA PROCESSING OPPORTUNITIES
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We are a growing division of Automatic Data Processing Inc., and a supplier of on-line and batch brokerage services in the Downtown New York area. Our environment consists of two IBM 370/158's and an Amdahl V6 running under MVS/JES 2, distributed data processing and a data communications network nationwide of on-line applications. This means Challenging Opportunities, Recognition and Rewards.

SYSTEMS PROGRAMMERS

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- BAL programming knowledge required.

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- To manage technical support staff of three.
- Responsible for designing all future data communications networks.
- Evaluate, select and recommend data communications equipment.
- Support Data Communications Tech Center.
- Thorough knowledge of both ASYNC and BYSYNC protocol required.

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- Direct, manage and control complete data processing operations for the 12 MIDNIGHT to 8AM SHIFT.
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Ms. Elaine Miller, Personnel Department

Automatic Data Processing

Financial Data Services

42 Broadway, New York, N.Y. 10004

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For all of us.



United Way

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Build a meaningful career in southwest Houston at Gulf Oil's newest and most advanced computer complex. Gulf Science & Technology, one of the operating companies of Gulf Oil, offers an excellent benefit package and competitive starting salaries for...

APPLICATIONS PROGRAMMERS

These positions offer the qualified data processing professionals challenging work assignments in a state of the art computer complex. These positions also offer outstanding potential for career growth and advancement for the person who is willing to meet the challenge.

Prerequisites include a degree in Computer Science or related field, and 2-5 years experience in commercial applications programming using COBOL in a 370/OS-VS or MVS environment. Good working knowledge of IBM JCL and experience with IMS, TSO, and VSAM a definite advantage.

Salaries will be commensurate with education and experience. Qualified applicants are invited to submit their resumes including salary history to:

Mr. J.P. Haney

GULF SCIENCE & TECHNOLOGY CO.

Drawer C71
P.O. Box 36506
Houston, TX 77036

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SYSTEMS REPRESENTATIVES

Greyhound Computer Corporation's rapid expansion has created additional opportunities for professionals with strong background and experience in 370 Systems/software to provide sales support in our Chicago and Boston regional offices.

Qualified candidates will be interested in expanding their technical skills and possess the potential to become a Computer Leasing Sales professional.

As the nation's largest computer lessor and a wholly-owned subsidiary of The Greyhound Corporation, Greyhound Computer enjoys a unique position in the computer industry. For more information on this unusual opportunity to combine your talents with our rapid growth.

**CALL
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in Phoenix**

OR send your resume, in confidence to: Personnel Manager; Greyhound Computer Corporation; Greyhound Tower; Phoenix, AZ 85077.

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DATA PROCESSING PROFESSIONALS

SYSTEMS ANALYST

Must be experienced in conducting independent systems studies from feasibility through implementation and capable of supervising an Analyst/Programmer staff in a project-oriented environment. Must have 3 years experience in an on-line teleprocessing environment. Data base technology would be a plus.

PROGRAMMER ANALYST

Must have at least 2 years experience in COBOL language. Assembler experience is desirable. Candidate must be capable of working independently in project-oriented environment. Position includes programming related to an on-line telecommunications systems, on an IBM 370/158 with data base.

SOFTWARE SPECIALIST

Must have 3 years of VS experience, preferably with MVS. Experienced with Assembler Language, System Generation, System Maintenance and Performance Tuning. Experience with IMS, TSO or VTAM is desired.

These positions include a comprehensive benefits package and salary commensurate with your experience and ability. For immediate consideration, please submit your resume including salary history and requirements to:

**PERSONNEL DEPARTMENT
FEDERAL RESERVE BANK OF ST. LOUIS
P.O. Box 442
ST. LOUIS, MISSOURI 63166**

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ADVANCED TELECOMMUNICATIONS

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Northern Telecom, Inc. continues as a leader in the design, development and manufacture of advanced commercial computerized telecommunications systems. We are an integral part of a billion dollar plus corporation. WE ARE ADDING 100 - PLUS ENGINEERS TO OUR TECHNICAL STAFF. These key positions are available due to our rapid expansion and planned continuing growth.

SOFTWARE ENGINEERING

SOFTWARE ENGINEERS

Openings at all levels of experience. Specify, design, develop and test real-time telecommunications software in one of the following areas: hardware diagnostics, telephone call control/call processing, equipment data update, data transmission, software development tools, or systems software integration and testing. Experience in structured design, coding, test and documentation of programs, plus a BS/MS CS or Math is highly desirable.

PROGRAMMER/ANALYSTS

Design software tools and maintain software programs for Data General Nova 3 systems, and install existing programs for our users. Requires mini-computer experience in a real-time environment, assembly language and/or COBOL language; and a BS/MS CS or equivalent.

HARDWARE ENGINEERING

CIRCUIT DESIGNERS - DATA

Design circuits for networks on a new PBX switching system or telecom based data handling/acquisition systems. Requires BS/MSEE and 3 plus years' digital design experience involving micro-processor components and systems, data transmission and modems or typically MSI technology and basic assembly language programming.

CIRCUIT DESIGNERS - D & A

Design and develop digital and analog micro-processor - based peripheral equipment for telephone switching systems, using TTL and CMOS devices. Requires BSEE and minimum of one year related experience, preferably with digital transmission, codecs, active filters, phase-locked loops and computer systems.

POWER SUPPLY DESIGNERS

Design, test and evaluate small solid-state switching power supplies. Requires BSEE and 3 plus years' related experience, including design of analog.

DIGITAL CIRCUIT DESIGNERS

Design remote peripheral equipment for PABX, including logic and circuit design, PCM and prototype testing. Requires BSEE with good exposure to digital circuit design, computer systems, phase-locked loops, low power Schottky and TTL.

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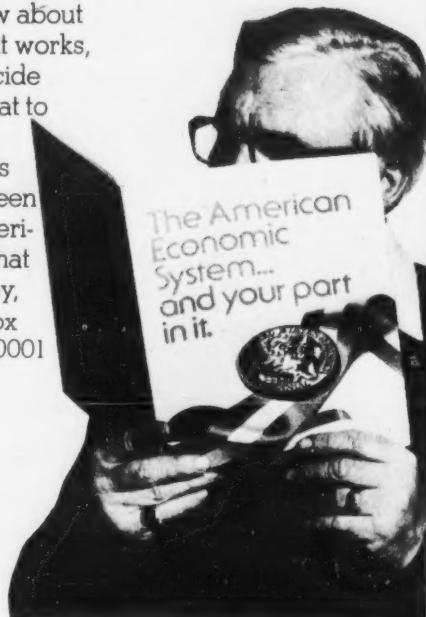
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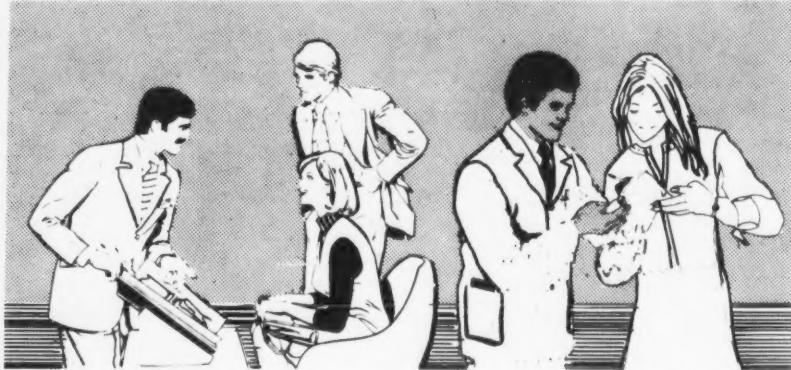
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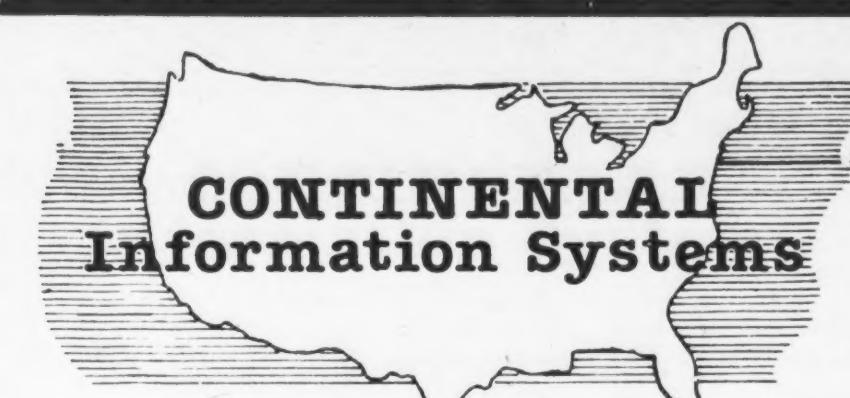
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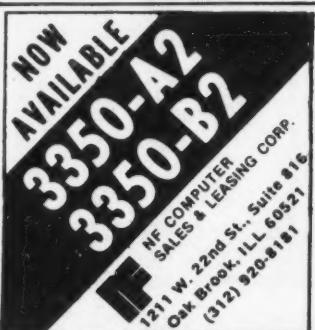
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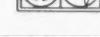
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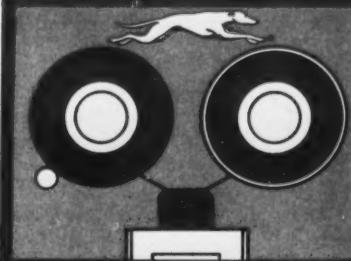
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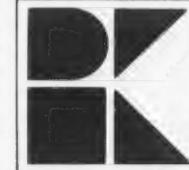
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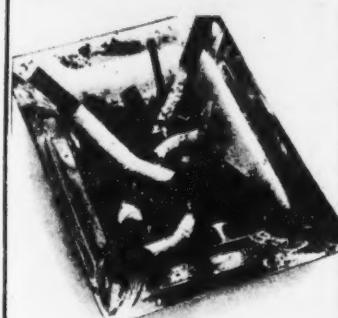
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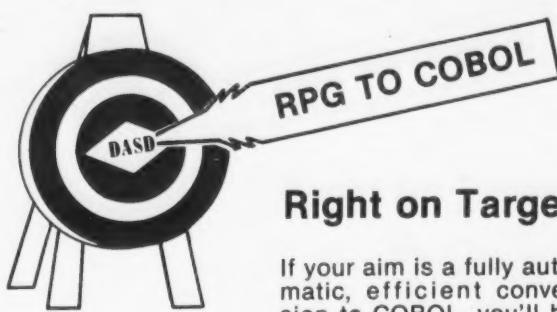
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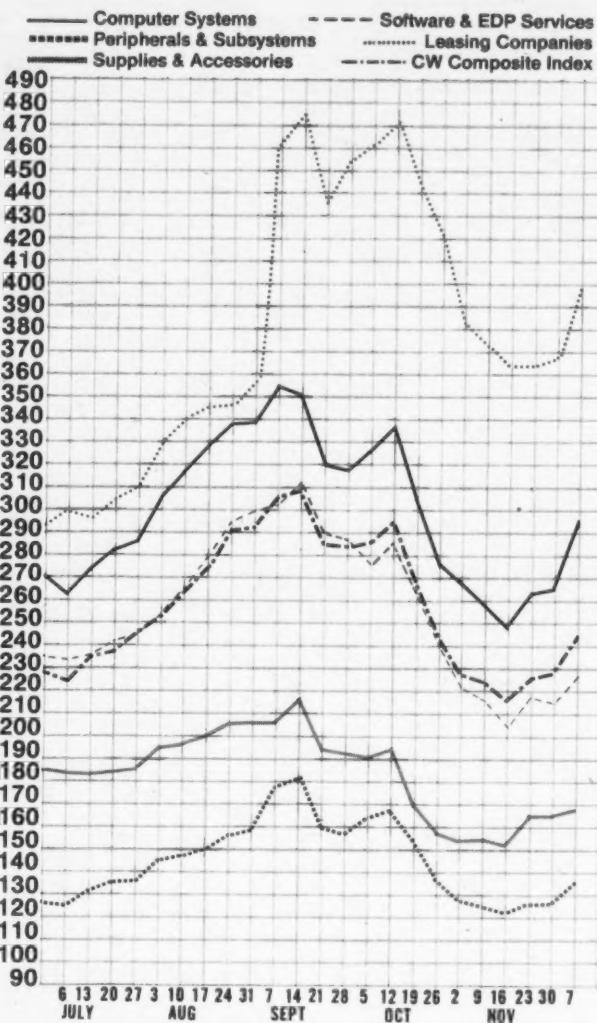
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ALPEX COMPUTER

Three Months Ended Sept. 30

1978	1977
Loss	\$141,032
9 Mo Spec	\$20,789
Cred	159,000
Loss	187,721
	115,393

a-From settlement of a lawsuit.

CENTRONICS DATA COMPUTER

Three Months Ended Sept. 30

1978	1977
Shr Ernd	\$5.36
Revenue	21,644,695
Earnings	2,129,971
	15,825,966
	3,083,006

COMPUTER INVESTORS GROUP

Three Months Ended Sept. 30

1978	1977
Shr Ernd	\$5.39
Revenue	7,043,000
Tax Cred	90,000
Loss	153,000
6 Mo Shr	39
Revenue	15,126,000
Earnings	854,000
	14,176,000
	(573,000)

DATA DIMENSIONS

Three Months Ended Sept. 30

1978	1977
Shr Ernd	\$2.29
Revenue	4,388,000
Earnings	231,000
9 Mo Shr	70
Revenue	11,609,000
Tax Cred	259,000
Earnings	550,000
	2,968,000
	161,000
	42
	7,867,000

INFORMATION INTERNATIONAL

Three Months Ended Oct. 31

1978	1977
Shr Ernd	\$5.13
Revenue	3,622,103
Earnings	328,749
6 Mo Shr	27
Revenue	7,283,322
Earnings	707,335
	3,403,345
	423,104
	23
	5,897,228
	606,975

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All statistics compiled,
computed and formatted
by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 6, 1978



EXCH	PRICE	1978 RANGE (1)	CLOSE DEC 6 1978	WEEK NET CHNGE	WEEK PCT CHNGE	EXCH	PRICE	1978 RANGE (1)	CLOSE DEC 6 1978	WEEK NET CHNGE	WEEK PCT CHNGE	EXCH	PRICE	1978 RANGE (1)	CLOSE DEC 6 1978	WEEK NET CHNGE	WEEK PCT CHNGE
COMPUTER SYSTEMS																	
A Amdahl Corp 28- 69 51 3/4 +5 3/4 +12.5																	
N Burroughs Corp 59- 87 73 1/2 +4 3/8 +6.3																	
O Computer Automation 15- 44 20 1/4 +2 1/2 +14.0																	
N Control Data Corp 23- 44 35 3/8 +4 1/8 +13.1																	
O Cray Research Inc 8- 30 28 +2 +7.6																	
N Data General Corp 42- 71 61 7/8 +3 7/8 +6.6																	
N Datapoint Corp 34- 75 56 +6 7/8 +11.6																	
N Digital Equipment 39- 54 50 5/8 +3 3/8 +7.1																	
N Electronic Assoc. 2- 13 7 1/4 +3 3/4 +11.5																	
A Electronic Engineer. 9- 19 12 1/4 +1 +8.8																	
N Four-Phase Systems 19- 66 31 1/4 +4 +14.6																	
N Foxboro 28- 40 31 1/8 -7/8 -2.7																	
O General Automation 7- 26 17 3/8 +3 7/8 +28.7																	
O GRI Computer Corp 1- 3 1 1/4 0 0.0																	
N Hewlett-Packard Co 62- 93 87 5/8 +5 3/8 +6.5																	
N Honeywell Inc 43- 72 68 3/4 +4 7/8 +7.6																	
N IBM 236-305 278 +12 1/2 1/2 +6.7																	
O Management Assist 9- 29 18 7/8 +2 3/4 +17.0																	
O Manufacturing Data S 9- 23 20 3/4 +2 1/8 +11.4																	
O Microdata Corp 10- 23 18 7/8 +1 5/8 +9.4																	
O Mini-Computer Syst 4- 8 6 1/4 +1 +19.0																	
O Modular Computer Sys 7- 17 10 1/4 +1 1/8 +12.3																	
N NCR 37- 67 62 1/2 +4 3/4 +8.2																	
N Prime Computer Inc 20- 43 30 3/4 +4 1/8 +15.4																	
N Perkin-Elmer 17- 28 27 5/8 +3 +12.1																	
N Sperry Rand 33- 49 46 +3 1/8 +7.6																	
A Systems Eng. Labs 11- 24 14 5/8 +2 +15.8																	
O Tandem Computers Inc 13- 37 25 1/2 +1 1/2 +2.0																	
A Wang Labs. 12- 32 29 +5 3/4 +24.7																	
LEASING COMPANIES																	
R Booths Courier Corp 13- 21 21 3/4 +3 1/4 +17.5																	
O Comdisco Inc 5- 22 15 +1 1/2 +11.1																	
A Commerce Group Corp 1- 1 1/4 0 0.0																	
A Computer Invstrs Grp 1- 7 3 +1 1/8 +6.3																	
O Continental Info Sys 5- 15 7 1/2 +1 1/4 +20.0																	
M Datronix Rental 1- 3 2 0 0.0																	
A DCL Inc 3- 5 4 3/8 +7/8 +25.0																	
N DPE Inc 8- 14 10 3/4 +1 1/4 +13.1</td																	

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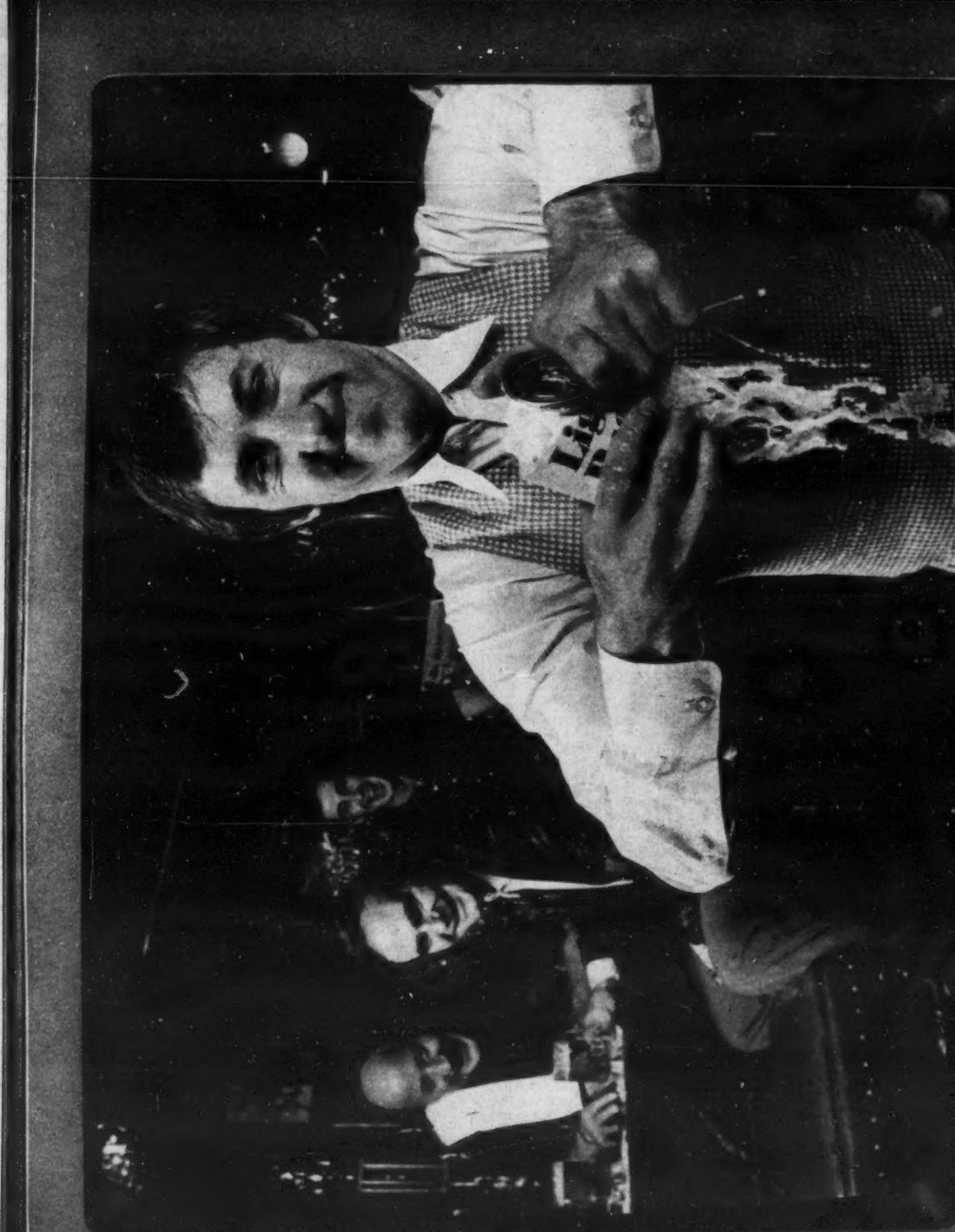
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*Fran Tarkenton, Minnesota Vikings' Quarterback